MAINTENANCE SERVICES

SELECTION • INSTALLATION • INSPECTION • UPKEEP • ORGANIZATION

People and machines engaged in production must be supplied with buildings and with many services, such as electrical and mechanical power, heat, light, water, sanitary facilities, air conditioning, ventilation, dust collection, protection, communication, housekeeping. Providing these services and keeping them in condition for efficient production constitutes the Maintenance Service function. ¶ Practically every activity of maintenance service has to do with the Selection, Installation, Inspection, or Upkeep of equipment. For the benefit of FACTORY'S readers these classifications are carried at the top of the first page of each major article, and check marks are set against the classifications to which the articles belong. A fifth classification — Organization — is checked when the article deals with maintenance department organization and direction

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FACTORY MANAGEMENT AND MAINTENANCE

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

EDITORIALS

L. C. MORROW . . . *Editor*

It's What Maintenance Doesn't Have to Do That Counts

"YOU'LL HAVE TO MEASURE the efficiency of my department by the work that we don't have to do." That answer was given to an executive by a grizzled old maintenance chief who had come up the hard way and knew all the answers.

It is true, unfortunately, that the work of the maintenance department cannot fairly be measured in all its dimensions with the same yardstick which is applied to the production departments. Their function is to produce certain things, and the quality and quantity of their output can easily be determined. In such activities as laying floors, stringing wires, or installing equipment, say, the output of the maintenance department is visible, and can be measured.

One of its most important functions, however, lies in preventing trouble and maintaining continuity of all plant services. The results of this work are invisible and not readily measurable. All too often recognition and credit for such results are likewise nebulous.

In plain fact, it takes as much or more knowledge, planning, and foresight to maintain continuity of service at low cost as it does to do work or produce results that speak for themselves.

First, there must be careful study of requirements and operating conditions, followed by selection of the proper equipment. Experience shows that it pays to study new items of equipment carefully in order to check the power required to drive them, make sure that provisions for lubrication are adequate, detect and remedy any possible weaknesses.

Then comes installation, and again all possibilities of trouble caused by anything from atmospheric conditions to vibration must be foreseen and removed or minimized as much as possible.

After equipment has been put in service an inspection routine adequate both in details and frequency must be worked out for it, which will immediately show its condition and disclose any weaknesses or signs of trouble. Coordinated with this inspection, men and facilities must be available for promptly making any necessary repairs.

To keep work moving smoothly and insure that jobs will be done at the proper time requires skillful scheduling and planning. Work that is done hurriedly or delayed until small defects or weaknesses become serious inevitably means extra work and expense later on.

Work that does not have to be done, because the necessity for it has been eliminated, may well be the finest testimonial to the efficiency of the maintenance department.

There Are Many New Answers to Old Plant Problems

STRUGGLE TO REDUCE manufacturing expenses so that more goods can be made and distributed for fewer dollars per unit, despite higher operating and material costs, goes on relentlessly year after year. And every year those who wage that grim battle get substantial help through the development of equipment of all kinds which is an improvement over anything theretofore available.

Taken individually not all of these developments are spectacular. Collectively they offer every plant impressive opportunities to step up efficiency, cut costs, improve quality of product.

The year just past brought a full measure of new and important developments in practically every type of equipment. Engineers, designers, metallurgists, and workers in many other fields cooperated in producing new motors, controls, electrical protective devices, materials handling equipment, lubricating devices, what not. Some items represent designs that may fairly be called new. Others embody significant improvements in important details. All are the result of careful study of the good points and weaknesses of older designs.

The answer to many maintenance and production problems will be found in equipment that was perfected and made available to industry last year.

They Didn't Pick the Right Motor

J. V. HUNT

Motor Division, Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

MANY INDUSTRIAL DRIVES require more than usual alertness on the part of plant electrical engineers to make sure that the correct a.c. motor is applied. Cyclic duty, high-inertia drives, rapid reversing service, and peak loads are typical of common conditions that should be carefully analyzed in order to match the motor with the job. With the wide variety of motors available, the correct one can be found for each load. The problem is to know when to apply a low-starting-current, high-slip, synchronous, wound-rotor, or other type of motor.

To Help You Choose

Here are some case examples which may be helpful in choosing motors for machines that have similar load conditions:

1. *High-slip motor replaced ordinary type.* For driving material handling rolls on cyclic duty where the motor is started and reversed, plugged frequently while loaded, a normal-slip squirrel-cage motor was first applied. This motor required about 600 per cent of full-load current when starting. It tended to overheat and was eventually replaced by a high-slip squirrel-cage motor of the same rating, which required only about 400 per cent of full-load current when starting, although developing about twice as much starting torque.

This high-slip motor operates much cooler than the other motor and consumes considerably less power when starting and on being plugged.

2. *Fan drive needed a high-torque motor.* Some old sleeve-bearing ventilating fans which had been driven by a steam engine were changed over to motor drive, using a normal-torque squirrel-cage motor. Indicator readings on the steam engine showed that a 75-hp. motor had ample capacity for the job. When cool weather came, however, the oil congealed in the old sleeve bearings of the fan, and a crowbar had to be used to help the motor overcome the high static friction.

A high-torque, low-starting-current type of squirrel-cage motor of the same rating was substituted and now handles the load without trouble.

3. *Flywheel eliminates motor heating on compressor drive.* A standard squirrel-cage motor whose rotor was mounted directly on the shaft of a compressor became overloaded from high peak currents caused by unbalanced crankshaft effort.

This motor had normal slip, and it was undesirable to add resistance to the rotor since this would result in lowering the efficiency. Also any drop in speed would decrease the output of the compressor. Since the motor operates almost continuously, economical use of power is important.

The motor was returned to the factory, and a flywheel providing a considerable amount of extra flywheel effect (WR^2) was mounted on the rotor. Without any change in the motor's electrical characteristics, the flywheel enabled it to handle the peak loads easily and with less current.

4. *Short-time motor saved money on mold drive.* A tire mold requires very high torque to close it tightly, and high starting torque to open it. It has been found that a short-time-rated, high-slip squirrel-cage motor takes care of this job nicely at low first cost.

A continuous-rated motor with larger normal slip would have provided sufficient torque, but it would have given no better operation and been considerably more expensive.

5. *High-torque motor in rapid reversing service.* Operating a sheet catcher in a steel mill imposes severe duty on a motor. High torque is required for plugging duty, which occurs about 25 times per minute. The motors must be totally inclosed and the surrounding temperature is high due to the presence of hot sheets.

It has been found that a squirrel-cage motor with an oversized frame having about 6 or 7 per cent slip and designed for exceptionally high starting

Electric motors and farming were pet hobbies of J. V. Hunt even before he joined Westinghouse 26 years ago. Last year he combined them by buying a 50-acre farm not too far from Pittsburgh, where he spends every weekend fitting just the right motor to each particular farm chore. After graduating from Westinghouse Technical Night School in electrical engineering, he came to Westinghouse as an assistant buyer in the purchasing department, was later transferred to applying motors in the lumber, logging, and mining industries. Since then he has been a member of the motor division at East Pittsburgh, working with motors day in and day out. Mr. Hunt has contributed to FACTORY before

torque can take care of the fast plugging cycle without undue temperature rise.

6. *High-torque motor required to start long conveyor.* A normal-torque squirrel-cage motor was installed on a long conveyor. This motor had sufficient torque to handle the conveyor under normal conditions. A combination of adverse conditions, however, such as low voltage, and cold weather which congealed the oil in the sleeve bearings of the conveyor, caused the motor to fail to start the conveyor when it was heavily loaded.

The trouble was corrected by substituting a high-torque, low-starting current motor.

7. *Smooth reversing obtained by motor with "soft" plugging torque.* For reversing heavy drums or tumblers such as are used on a large reversing washer, it was found that a normal-torque motor jerked the mechanism too much when the motor was repeatedly plugged. Eventually the equipment was damaged.

The difficulty was overcome by applying a motor with soft plugging torque, in the neighborhood of 100 per cent of full-load torque. This motor has ample strength for reversing the heavy mechanism, and operates smoothly.

8. *Repetitive peaks handled by high-slip motor.* On textile loom drives where the shuttle causes peak loads to occur about three times per second, a peculiar condition arose. Two groups of motors with different characteristics were used in this mill. All motors were equipped with manual starters having thermal overload relays. One type of motor, which had about 3 per cent slip and no extra flywheel effect in the rotor, repeatedly tripped out the overload relay in the starter. The other type of motor, which had 5 or 6 per cent slip and extra flywheel effect in the rotor, displayed no tendency to trip the relays.

9. *Plugging duty required low-inertia rotor.* A slotting machine, direct-connected to the driving motor, reverses 40 times per minute. A normal-torque, normal-slip squirrel-cage motor was applied without due consideration of the operating requirements and burned up, due to the high plugging current.

A properly designed squirrel-cage motor with high slip (high resistance) and a low-inertia rotor was substituted, and operated satisfactorily.

10. *Synchronous motor saves on power bill.* A 150-hp., high-torque squirrel-cage motor was used for the

Characteristics and Applications of Alternating Current Motors

Kind of Motor	*Range of Horse-power*	*Starting Torque, Per cent of Full Load*	*Pull-out Torque, Per cent of Full Load*	*Starting Current, Per cent of Full Load*	*Speed Characteristics*	*Advantages*
General purpose. Normal starting torque and starting current. (NEMA Class A)	1–200	Up to 150 Under 3 hp., 1800 r.p.m., 200–250	200	600–700 (Low for 30 hp., 1800 r.p.m. and less. Normal from 30-200 hp.)	Constant	Lowest operating cost. Few wearing parts. Simplest, lowest-cost control and protective devices
Typical Applications:	Ordinary industrial drives — compressors (unloaded start), crushers, drillpresses, lineshafts					
Low-starting current. Normal starting torque. (NEMA Class B)	1–200		200	500–600	Constant	
Typical Applications:	General industrial drives					
High starting torque. Low-starting current. Normal slip. (NEMA Class C)	3–200	200–250 (For 3-hp. 1800 r.p.m. use standard general-purpose motor)	150–175	500–600	Constant	
Typical Applications:	Those requiring high starting duty — compressors without unloaders, heavy conveyors					
Low starting torque. Low starting current. (NEMA Class F)	1–100	75–100	125–150	400–500	Constant	
Typical Applications:	Where smooth acceleration for plugging service is required					
High Slip	1–150	250–300		400–500	Varying	Speed drops off as load increases
Typical Applications:	For flywheel or intermittent high-peak loads					
Synchronous	30–200	40–200	150–250	Depends on torque	Constant	Synchronous speed maintained at all loads
Typical Applications:	For high power factor or power factor correction. Same as normal- and high-torque squirrel-cage motors					
Wound rotor	1–200	High — depends on secondary resistance	200	100	Constant or variable	Full-load torque can be developed when starting with approximately full-load current
Typical Applications:	Adjustable-speed drives — blowers, cranes, conveyors, crushers, fans, hoists, pumps					
Repulsion-start induction Repulsion induction Capacitor	¾–3 3–5 1–20	200 to 500	200	Low	Constant	
Typical Applications:	Heavy duty for blowers, compressors, fans, pumps, shop tools, stokers, door operators					

group drives in a flour mill where the various belted machines are installed on four floors. This motor developed about 200 per cent of full-load torque while starting. High torque was required because of the large amount of friction and inertia in the group of machines.

So far as handling the load was concerned the squirrel-cage motor was satisfactory, but it operated at lagging power factor.

A 100-per-cent-power-factor synchronous motor which develops 200 per cent of full-load torque while starting was substituted. It operates at higher efficiency, made it possible to avoid the penalty charge for low power factor.

11. *Smaller motor cost less, serves better.* The elevator legs for a bucket conveyor handling loose material required a normal-torque, squirrel-cage motor rated at 125 horsepower because of the high torque required for starting. This motor operated below its maximum efficiency and at low power factor, due to the light load after the conveyor was started.

A high-torque, low-starting-current squirrel-cage motor rated 100 horsepower was substituted for it. This motor not only has ample torque for starting, but it also operates at higher efficiency and power factor.

12. *Punchpress drive required normal-slip motor.* The frequency with which peak loads occur, must be considered when applying motors. This fact was demonstrated by the application of a 7½-hp., high-slip motor to a punchpress equipped with a flywheel. So far as torque requirements were concerned, 7½ horsepower was ample for the material handled by the press, but the number of strokes per minute was so high that this motor never reached its full-load speed—it burned out.

Loads Must Be Studied

The flywheel was removed and a normal-slip motor of the next larger rating (10 horsepower) was substituted. This motor has ample pull-out torque to drive the press through peak loads without the aid of a flywheel, and its thermal capacity is ample for the duty cycle.

Loads such as described in the foregoing should be carefully studied before applying a motor. And to help pick the right motor, it will be worthwhile to review briefly the basic types and their general use in industry. This information is summarized in the table.

A large portion of a.c. motor applications are taken care of by squirrel-cage motors, of which there are several variations in design. The different characteristics are usually obtained by changes in rotor design.

When applying a motor to a job such as driving a feed table in a grinding department, it is essential to find out beforehand the conditions to which it will be subjected

Initially, normal-torque, low-starting-current motors, were more expensive than normal-torque, normal-starting-current motors, but these motors are now priced the same. Both are designed for full-voltage starting.

Since they have the simplest construction and lowest price, these motors are used for the great majority of applications. The four-pole designs develop a starting torque of 150 per cent of full-load torque, which is ample for most applications.

If the driven machine imposes heavy starting duty, such as compressors or plunger pumps starting under full load, the high-torque, low-starting-current motor which develops a starting torque of 200 to 250 per cent of full-load torque is usually best.

For applications where high peak loads are encountered and where a flywheel may be used, it is desirable for the motor to slow down rapidly as the load is applied. This action permits the flywheel to give up its stored energy by carrying the driven machine over the peak load.

This high-slip motor is designed by NEMA as Class D. It usually has 9 per cent or higher slip and develops about 300 per cent of full-load torque on starting. The punchpress motor is a typical example of this type.

Synchronous motors are used where strictly constant speed is required, even in the small sizes, but they are usually applied in the larger ratings where high power factor or power factor correction is desired.

Many applications are encountered where adjustable speed is required. For applications where two, three, or four definite speeds are needed, the multi-speed squirrel-cage motor may be used.

In some applications where the generating capacity is limited, motors are required to have exceptionally low starting currents. To get 100 per cent starting torque at full voltage, a squirrel-cage motor of normal design requires from 400 to 450 per cent of full-load current. If a high-torque motor is used in connection with an auto-transformer to reduce the voltage when starting, the starting current can be reduced to 200 or 250 per cent of full-load current when developing 100 per cent starting torque.

For Smooth Starting

A wound-rotor (slipping) motor will develop full-load torque when starting with approximately full-load current; therefore it is recommended for constant-speed applications where smooth starting with very low current inrush are required.

In addition to electrical characteristics, mechanical improvement of motors has advanced steadily. Today open motors are so thoroughly insulated that they will withstand dust, dirt, and moisture, but where these conditions are very severe the cost of caring for and cleaning open motors may exceed the additional cost of an inclosed motor.

Why Wait for the Firemen?

There are extinguishers for every type of fire. Pick yours as carefully as you pick all your other service equipment. Locate at strategic points. Be sure they're ready for use. See that everyone knows how to use them

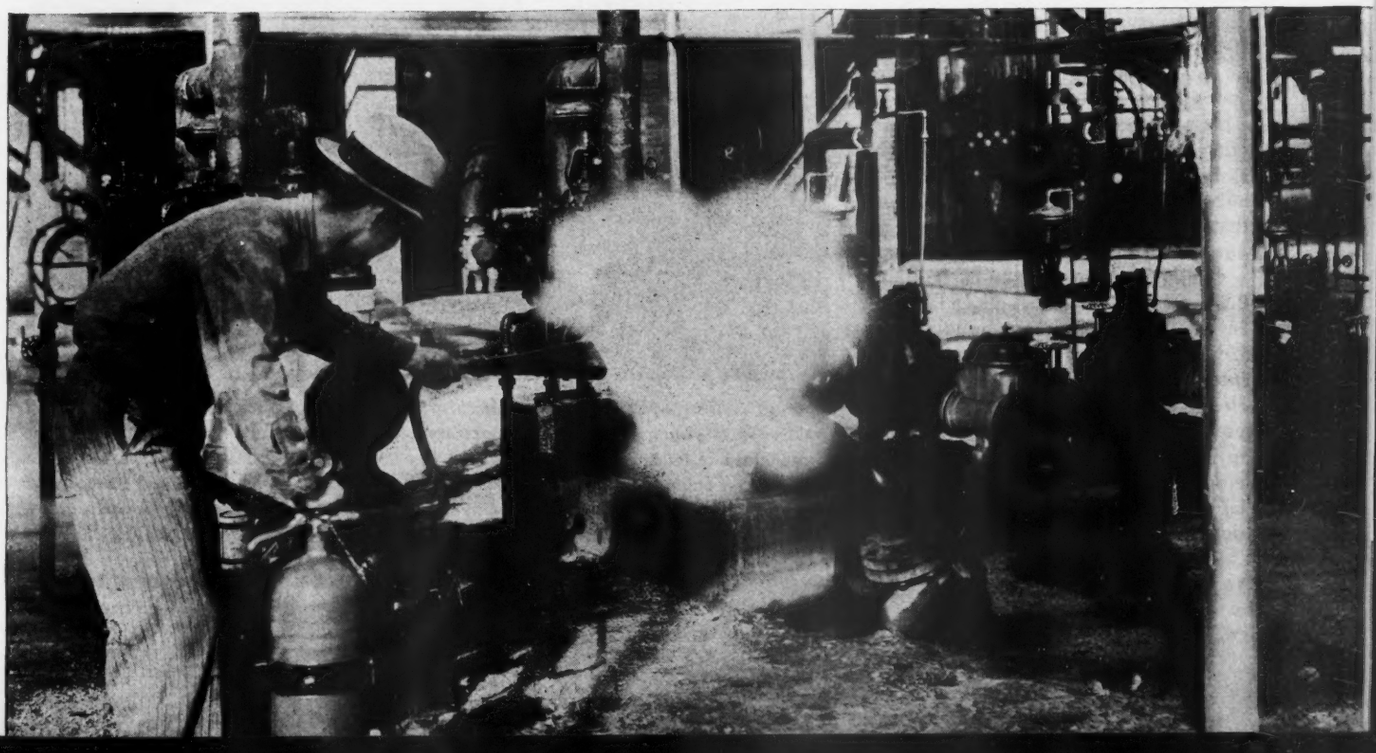
Ready for action with Fyr-Fyter vaporizing liquid extinguishers (right), hand grenades, and a Kidde carbon dioxide extinguisher

Waste paper and trimmings in a large printing plant constitute a fire hazard which is safeguarded by a conveniently placed General Fire Truck soda-acid extinguisher

A Pyrene vaporizing liquid (carbon tetrachloride base) extinguisher goes into action in a machine shop where a blaze may involve electrical equipment

In a busy maintenance department shop a foam extinguisher, American-La France-Foamite, is always on guard, ready to smother industry's No. 1 enemy

Gasoline and oil fires present serious and unusual problems; they are attacked in this refinery by Kidde carbon dioxide extinguishers



Learns About Floors—and Tells

Maple, wood block, concrete, mastic—NCR tries out all kinds. Knows which one to use where. Learns how to keep little cracks from becoming big holes. Here's its story

GEORGE V. CLOW

Construction Engineer, National Cash Register Company, Dayton

THE BEST FLOOR MAINTENANCE, like any other branch of maintenance work, is preventive rather than repair. When a floor starts to go, the trouble spreads rapidly—from the cause that started the difficulty. For example, a concrete floor in an aisle develops a cross crack. Trucks pound down the edges, develop it into a rough-bordered hole. The bigger the hole, the heavier the blow from each succeeding set of truck wheels. Let it go for a year and it may mean tearing out and re-laying 20 or 30 square feet. Seal over the crack at the first sign of roughened edges, and it may wear for another five years without further attention.

In our plant we have hard northern maple floors, or wood block, wherever men work. Basements of the main buildings are used as stockrooms, and these floors and the connecting service tunnel floors have a considerable diversity of floor types. Hard mastic and concrete with integral and surface hardeners are used on many of our main trucking aisles. In pickling rooms we have mastic floors, in plating we have pitch floors which are essentially the same as a built-up roof. Here and there we have other specialized types of floors installed for special purposes—not to mention the small experimental sections that we are continually trying out in our search for better wearing surfaces.

Our maple floors are $\frac{25}{32}$-in. laid on a 2 x 6 sub-floor on edge spiked together. In the first steel frame buildings the 20x20-ft. bay was broken up by one intermediate beam giving a 10-ft. span. Heavy loads of industrial motor trucks produced a weaving that was sufficient to break the tongue and groove of the maple flooring. This was overcome in later buildings by introducing an additional beam that cut the clear span to 6 feet 8 inches. As a result of this experience and for ease of replacement, the standard tongue and groove was abandoned and a half-round tongue and groove substituted. It is much easier to work a board of this type in or out without damage than it is a tongue and groove of conventional design.

Responsibility for floor repairs lies with the construction department. Maple floors are repaired or replaced whenever they develop bad tongue and groove breaks or wear down sufficiently to cause a groove break with resulting splinters. Our greatest difficulty is to convince the foreman or section head that when such a failure comes, an area much larger than is apparent must be relaid, and that there is no economy in shimming up the adjacent thin flooring to make it match the new in thickness, as such repair work results only in more serious failure at an early date.

All maple floors are treated after laying with engine oil thinned with about one-third benzine. This is repeated after every few moppings to lay any dust. Floor repairs are always planned so as

George V. Clow, shown here on an inspection tour—he's the one who stands and points—is a 25-year man at National Cash Register Company. A graduate of Ohio State, class of 1908, his first job was with the Commissioners of Sewerage, in Louisville, as assistant engineer. Later he worked for the City of Cincinnati. Followed service with Morgan Engineering Company in Dayton on a preliminary flood-prevention survey. Since 1915 he has been serving as construction engineer for National Cash Register

not to interfere with transportation or production, by taking sections that will permit a diversion of traffic or shifting men to other machines. If large areas are involved, they are held over until the Christmas and New Year's holidays or summer vacation periods.

For a long while we cleaned all wood floors with a lye scrubbing solution. When used on wood block floors it soon softened the asphalt binder and great sections of loose block resulted. By switching to a phosphate cleaner all this difficulty has been avoided. Beyond the weekly mopping with cleaner, we oil our maple floors about once a month. And when a floor gets worn to a slightly roughened surface, we are likely to go after it with a sanding machine to restore smoothness.

Sanding an oak parquet floor of herringbone pattern on the executive office floor

Wood Floors Can Take It

We have two major types of wood block floors, with some minor varieties. One is the conventional, grooved 2-in. block, the other the beveled 1⅜-in. block of herringbone construction. Both floors stand up well under even the hardest service in our plant. Occasionally, of course, an individual block gets damaged when someone accidentally drops a heavy die.

Occasionally, too, dirt gets underneath a block and works it loose from its mastic base, and it becomes a floater raised above the surface. Under such circumstances, we send a man to take out the block, scrape the dirt out, and lay a new block. After enough years of trucking, the edges of blocks tend to wear off, leaving a rounded hump in the middle of the block. When this creates a cobblestone effect for trucking, we re-lay the roughened section with new blocks.

For other than maple and wood block floors, the construction department relies for inspection pretty much on the operating departments and on the transportation department. The truckers are constantly on the lookout for rough spots in the aisles, because hitting a rough spot at a good speed may very well dump a load or cause other damage. Their instructions are to report to their department head any needed floor repairs. And the transportation department notifies construction. Similarly, if a concrete floor in a stockroom becomes unduly cracked or pitted, the foreman is encouraged to pass along the word so that repairs may be undertaken.

Concrete Trucking Aisles

Originally, most of the trucking aisles in our buildings were made of ordinary concrete, except in those buildings having wood block floors. But over the years these concrete floors have been pretty well replaced with floors especially designed to stand up under the steel wheels of the trailer trains. We patch concrete until next inventory shutdown, then replace.

Largest proportion of these aisles is now in an integrally hardened concrete. The one weakness for which we must keep alert on those floors is the development of cracks. A crack across an aisle spreads like an unchecked infection. Our practice is to send a maintenance crew around every few months with a special patching asphalt which is applied hot to the cracks after they have been cleaned of loose material. A crack thus caught in time and patched hot will stand up indefinitely; in fact, it seems to serve a useful purpose as an additional expansion joint.

Another large proportion of our trucking aisles is now in a hard mastic. This surface stands up remarkably well against cracking and crumbling, since it seems to be practically self-healing. Under certain conditions it requires a highly specialized type of maintenance attention. All our metal cuttings are hauled through our basement-level tunnels. The fine cuttings that are liberally wet with cutting oil cause the trouble. They drip out of the trucks on the floor. On mastic, this oil and fine metal catches dirt, builds up a coating of rubbery, metal-studded hard mud on top of the floor surface, sometimes to a depth of a quarter inch or more. This soft surface makes for harder trucking.

We have yet to find a practicable method of routine cleaning that keeps this coating off floors exposed to oil drip from fine metal cuttings. We simply let it build up for six months or so. When we shut down at vacation time and at inventory time, we give this surface its special attention. A flattened hoe makes an excellent scraping tool. A man working persistently at it can peel off the coating. It is a slow job, but necessary. And it restores to the mastic the excellent trucking surface that is one of its characteristics. Because of this tendency, our present inclination is to install mastic in aisles that have no oil drippings as part of their normal exposure, and to install integrally hardened concrete in aisles where this exposure is present.

One department subject to heavy trucking is our laundry, especially its washroom. This floor has always been a problem, since it is exposed to atmospheric heat, washing solutions, and heat from wash water that is dumped into the drains. It was too tough a job for concrete because of the solutions. When we tried mastic, we got uneven surfaces because a heavy truck left standing on a hot mastic surface would soon sink into the floor. Finally we solved this problem, we believe, by the use of armored mastic. On the sub-floor one inch of hard mastic was laid. Then on this was placed a series of 12x12-in. cast-iron grids with 1-in. squares about 1 inch deep. On this grid, hard mastic was poured. Now the trucks are supported close to the surface by the grid, and the mastic protects the metal from rust and corrosion, and softens the trucking noise.

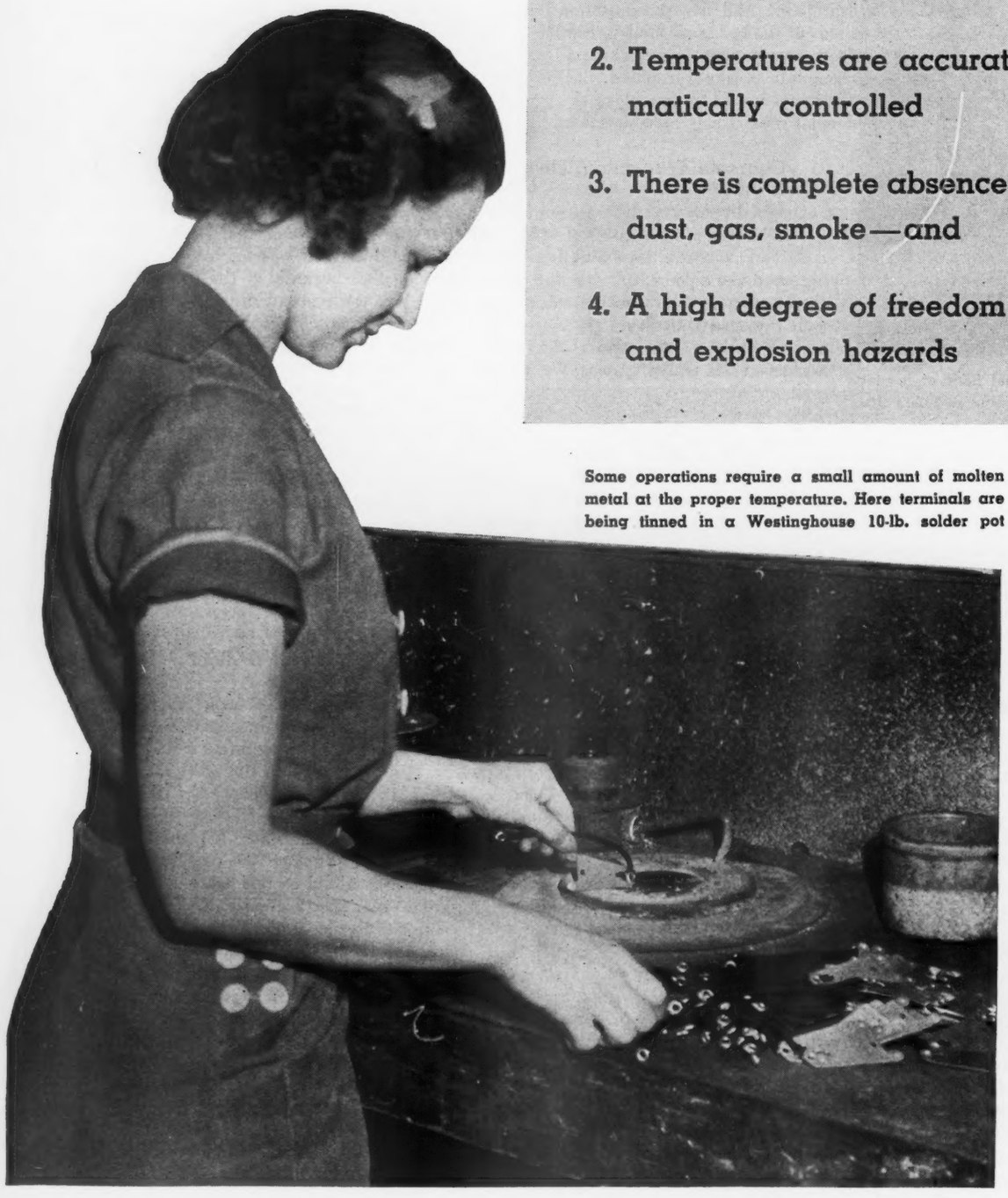
A Roof for a Floor

In the plating department we have found it possible to reduce floor troubles to a minimum by substituting a roof for the floor. This floor is, literally, laid as a roof. It slopes 3 inches center to side in a 30-ft. bay. It is laid on 2-in. cypress, with a spline. The spline is poured full of asphalt. Then a five-ply, built-up pitch roof is laid on this base—a standard 20-year specification roof. The only major difference is that instead of roofing gravel, our floor is finished with a coarse sand which is almost a very fine gravel. When the floor surface needs repairs, we go at it exactly as though it were a roof. We pour on a little more hot pitch and sand it. The men do not stand on this floor at their regular work positions. Instead, they have wood slat platforms which keep them out of the wet. And the plating tanks stand up on supports off the floor.

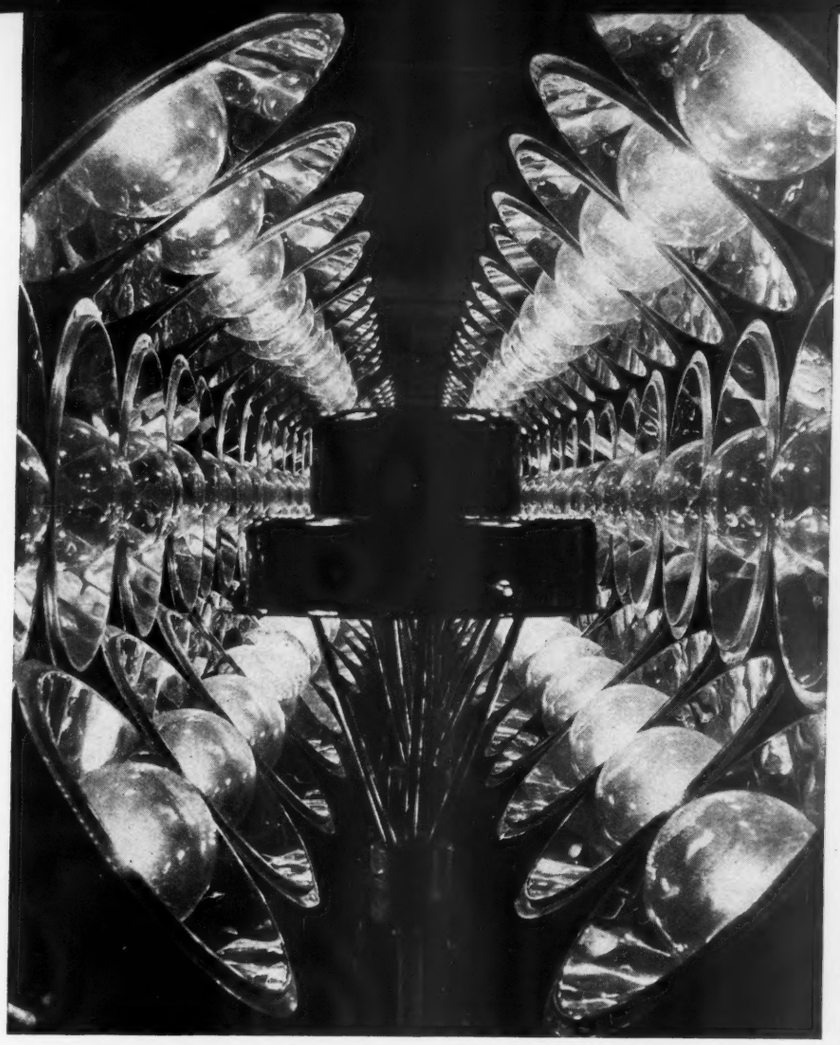
"I'll Take Electric Heat"

SAY THESE ENTHUSIASTIC USERS *BECAUSE*

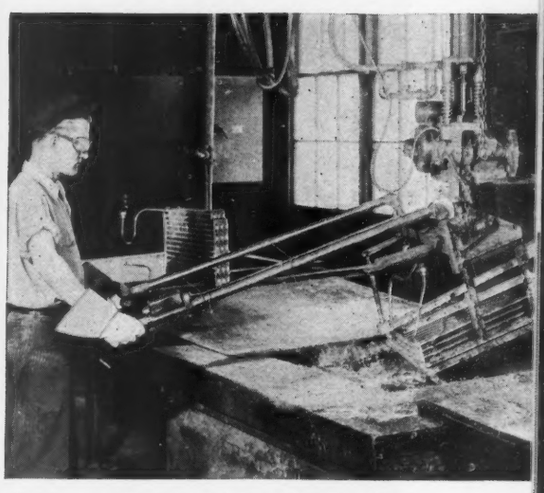
1. It is easy to apply exactly where and when you want it
2. Temperatures are accurately, automatically controlled
3. There is complete absence of flame, dust, gas, smoke—and
4. A high degree of freedom from fire and explosion hazards



Some operations require a small amount of molten metal at the proper temperature. Here terminals are being tinned in a Westinghouse 10-lb. solder pot

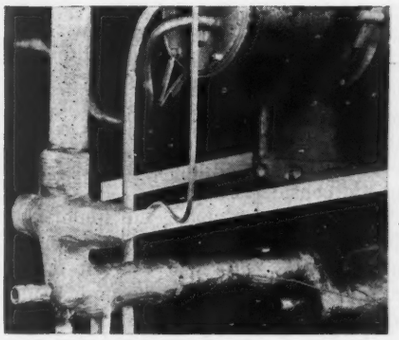


A radiant oven composed of Hall lamps and reflectors provides 450 degrees F., bakes the finish on headlights in 6 minutes



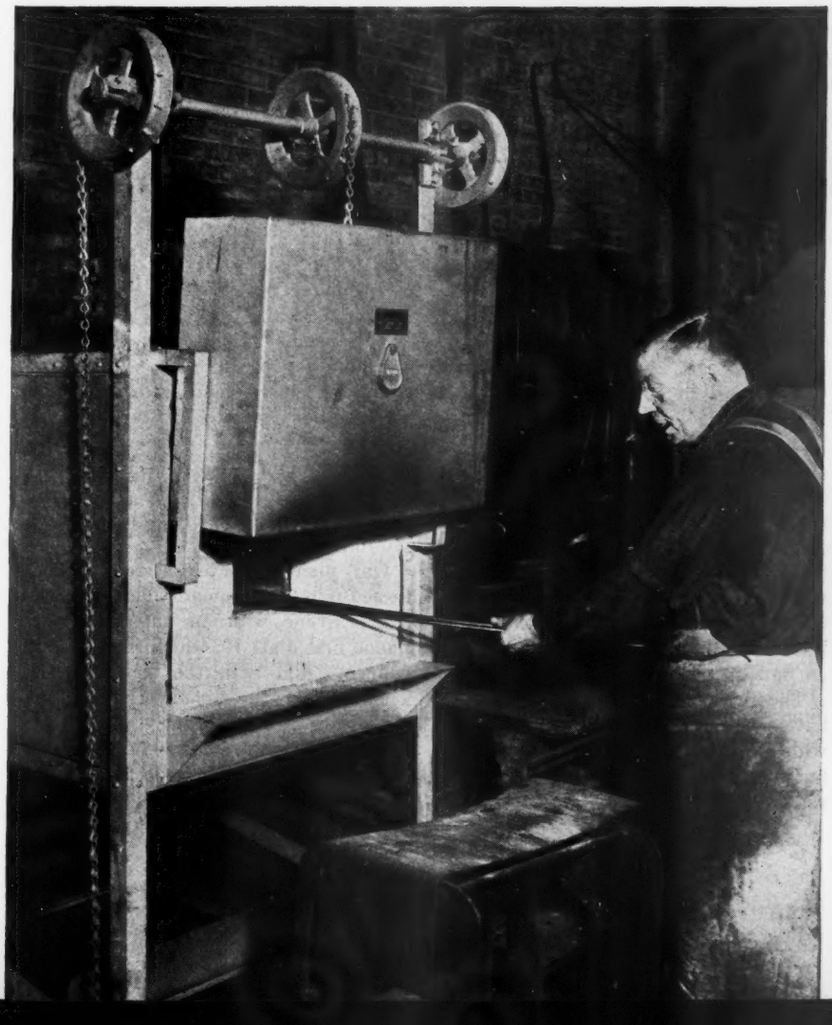
Immersion units, General Electric, rated 60 kilowatts keep 14,000 pounds of metal at 700 degrees F. for tinning condensers

Prior to being forged into 3-in. artillery shells, steel bars are quickly brought to the required temperature through inductive heating. High-frequency current in these Ajax-Northrup furnaces does the trick



To keep molten sulphur from chilling, pipe lines are wrapped with Rockbestos heating cable. Thermostats control temperature

Tools used to be hardened in an old forge, but it could not compete in quality or quantity of work with an electric furnace. This Trent box-type unit rates 14 kilowatts



$5,000 Dial System Worth Every Cent It Cost Us

S. A. SIMONSON
Works Engineer
Chicago Hardware Foundry Company
North Chicago, Ill.

REASON FOR INSTALLING a plant telephone system for intercommunication among departments was primarily to take the load off our outside board. Our one operator was worked to her limit. The traffic congestion made for long waits, poor service, too many reports of "his line is busy now." We had the choice of installing a larger board, for two operators, or else diverting some of the load.

Our decision was to install a dial system for interior use. At the moment it seemed like a lot of money to lay out just so that we could talk to ourselves. Nevertheless, we put in an automatic switchboard with capacity for 100 stations, and about 70 instruments. Cost of all equipment and installation, plus our own labor and material for stringing lines around the plant, amounted to about $5,000. Frankly, we wondered whether it could possibly be worth that much to us.

Exceptionally Profitable

Actually, this installation has proved to be one of those exceptionally profitable investments in equipment. It immediately eased our switchboard operator's work to the point where she could take on some office clerical jobs. It speeded up communication throughout the plant. We were enabled to take out several outside telephones immediately, followed one at a time by several more until today we have a ratio of approximately one outside telephone to each three inside telephones. At $18 a year per station for instrument rent, the saving is considerable.

To it may be added the important but hard-to-figure saving in personal and needless calls that are not made now because someone has to do his outside-line talking from his foreman's desk. There may also be included the costs of a second telephone operator's salary and the installation of a larger board, which we succeeded in avoiding.

Our automatic switchboard handles an average of somewhat more than 600 calls per day. Aside from interest and depreciation charges on the equipment, the costs are negligible. Our plant electrician averages not more than two hours a week on all jobs connected with our private telephone exchange. Total purchase of time and equipment from the manufacturer have been negligible: $30 in 1939; $12 in 1938; and so on. There have been, to be sure, a couple of larger items of expense during the ten years this system has been in service, but both of these were for improvements.

We shifted over from storage battery power, the only kind available when we bought the system, to a rectifier and transformer that gives us direct current at between 50 and 60 volts, depending upon how much current the system is pulling. Power cost per month is so small that we have never bothered to find out what it amounts to.

Tired of Replacements

Our other major expense came when, after six years, we tired of replacing some of the wires because the insulation weathered off and put in lead-covered cable as we should have done in the first place. Year in and year out, the direct expense of our private exchange is around $2 per station per year, or a little more than one month's charge for an outside telephone station.

Theoretically it should be possible to have just as good plant communications with an outside system as with an interior automatic system. But it does not work out so. For one thing, there is always that mental hurdle to get over: "It will cost $1.50 a month, does Jim really have to have it?" With the automatic system the attitude of the management is reversed. Then the question is: "Do you suppose Jim would have any use for it? Ask him, and give him one if he wants it."

When, as happens to be the situation at the moment, we have no spare instruments, it is much simpler to get an O.K. on the purchase of one at about $25 than to get approval for installing an outside telephone that will go on costing $18 a year to the end of time.

Better Supervision

Ever since we put in the automatic switchboard we have had plant telephones everywhere we can use them. It makes a great difference in the functioning of supervision. Our superintendents can reach by dial telephone all of the people with whom they need to deal—foremen, order tracers, and so on. Where formerly a superintendent walked out into the plant because it was easier than to try to do business by telephone, now he spends more time in his office.

This means that he is more readily available for consultation with executives, customers, and salesmen who would otherwise have to wait until he could be summoned in from anywhere about the plant. Also it means that he spends more of his time on actual control of his departments, and less on unproductive legwork.

Our plant signaling system is connected into the automatic telephone system. Anyone with an automatic telephone first dials 70, which immediately connects him with the signal board. Then he dials the signal, say 42, which he wishes to have rung through the plant. When the man who is being paged hears this signal he goes to the nearest private exchange telephone and

"Sig" Simonson (the one who's doing the pointing) went to work for Chicago Hardware Foundry Company in 1918 as draftsman and engineering department clerk. Several nights a week he commuted 35 miles in each direction to study drafting at Chicago Technical College. In 1924 he became works engineer in charge of equipment in a plant spread across 23 acres, manufacturing metal furniture and other products. Sig plays a little golf, but isn't very proud of it. Goes to Northern Wisconsin every summer after muskies, gets bass and pike instead. His pet amusement is tinkering with anything mechanical. Automobiles are so well made nowadays that he can't have the fun he used to, but he is hoping that Simonson Junior's new electric train will go haywire often enough to keep him busy at electrical maintenance these winter evenings. Both junior and dad will be busy, we bet

dials 79, which connects him with the telephone that is calling him.

This arrangement does not interfere with the more conventional use of the signaling system from the main telephone switchboard. The telephone operator can always tell who is being called on the automatic system, to avoid duplicate calls. Furthermore, we have the signals originating at automatic telephones speeded up enough so that they can be distinguished from the signals originated by the telephone girl. The man who hears himself called on the automatic system makes a call as outlined above. The response to a call sent out by the switchboard girl is to answer on an outside telephone if one is handy, otherwise to call her on the inside system to find out what is desired.

As an instrument of production control, the interior telephone system makes us wonder how we previously got along without it. Our plant has both basic classifications of work: jobs to customer's order and production for stock. In consequence, there is a steady flood of inquiries about when Job 43B17 will be ready, or whether that batch of bases has gone to the enameling department. When we need to know the answer to some such question, we want the information right now, perhaps while a customer is on the toll telephone, and not a quarter-hour hence.

Saves Smith's Time

Because a private system naturally makes us generous with telephones, we can reach every part of the plant directly. There is no such problem as calling Foreman Jones and asking him to send for Bill Smith a few hundred feet distant. Smith has a telephone, gets the call, answers in a fraction of the time otherwise required.

Similarly, if Smith knows a rush order is coming his way and suspects it is behind schedule he makes a few calls and learns exactly when he should have some machines ready to swing onto this job.

The diversity of our manufacturing processes and the size of the area covered by our plant, 23 acres, make telephone communication an absolute necessity in order to coordinate our operations and increase the effectiveness of supervision without requiring a greater number of supervisors. We have no way to measure, nor even to estimate, the advantages in the way of saving time and money that accrue from these uses of our private telephone system.

We feel certain of one thing: Any of our executive force, from top to bottom, would feel lost without an interior communication system. And, discussing it over the luncheon table, we generally end up by agreeing that we should find this method of handling plant business proportionately quite as useful whether we were working in a plant that covered 2 acres or 200 acres.

Whatever the size and character of the industrial plant, nothing else can take the place of having a telephone line available to every corner with no delay or extra expense.

It's Not the Oil You Use That Costs

It's the oil you waste that runs into money. Caterpillar confirmed its fears of extravagance by canvassing the oil situation—with startling revelations. Standardization and control were indicated as the proper but tough path to correct use and lower costs

EARL APPLEBY
Superintendent, Toolroom
Caterpillar Tractor Company
Peoria, Ill.

WHEN WE BEGAN THINKING about machine tool lubrication, it became apparent that the entire field had been allowed to grow up haphazardly. Even a casual look around the plant disclosed that there were an astonishing variety of oils and greases in use—far more than seemed likely to be necessary in a plant that is predominantly metal working, and in pretty heavy units. So we decided that we had better start out on the assumption that nothing we were doing would be considered correct until its correctness had been demonstrated.

Still further thoughts on lubrication showed that action should be taken at once to correct this condition. The first step was the authority granted us wholeheartedly by the management to act immediately on any change that we saw would correct the existing condition.

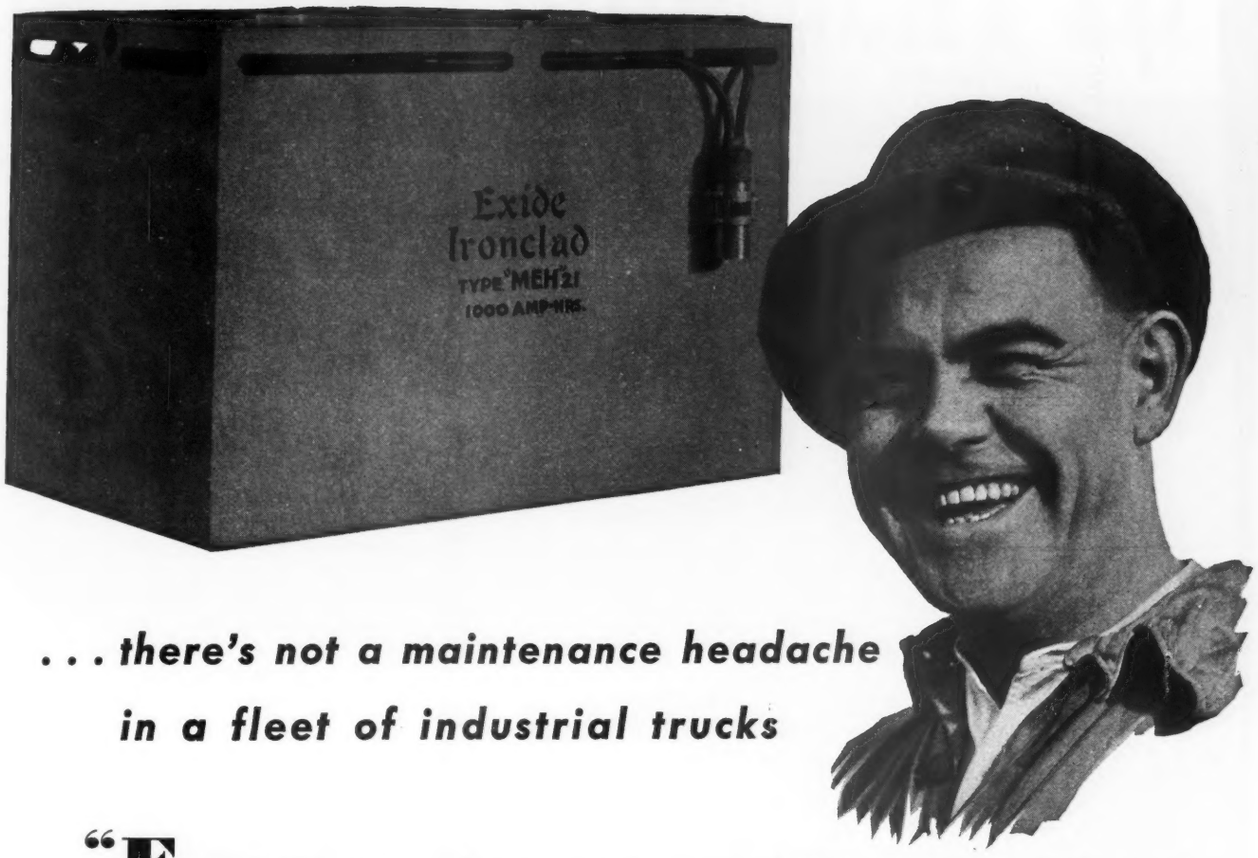
We undertook a canvass of the entire oil situation—cutting oils and lubricating oils—throughout the shop. We started in one building, went down every aisle, wrote down our findings. What the investigator looked for consisted of four points: (1) Brand name, (2) mixture, (3) work or material, (4) reasons for using the particular lubricant, as explained by the man who specified it.

What this survey disclosed was rather startling. Hardly two foremen were using the same oil for the same purpose. There was no consistency in the way it was done. And to anyone of any production or maintenance experience, it was clear that the number and variety of oils we were using did not make sense.

The men to whom responsibility for oil determination was given were shop men, not scientists. They set about educating themselves in the subject by

The machine lubricator in each department is held responsible for using oils properly, for keeping records of where he uses them

Using Exide-Ironclads



. . . there's not a maintenance headache in a fleet of industrial trucks

"EXIDE-IRONCLAD BATTERIES practically take care of themselves"—this is a comment originally made by a busy maintenance man, and its truth has been amply confirmed by experience in every branch of industry. Battery electric trucks themselves are trouble-free and economical to maintain. Exide-Ironclads are equally so . . . for many reasons.

The only attention they need is an occasional wiping off or blowing off with an air hose, and the addition of fresh water about every two weeks. Between shifts, discharged batteries can be replaced with freshly charged batteries in from two to five minutes, using skids or an overhead chain hoist. In addition, the Exide System still further cuts down the time and cost of keeping your trucks in continuous productive operation.

The Exide System scientifically determines the right size and type of Exide-Ironclad for your trucking job. "Tow-ins" and delays are avoided with the Exide Discharge Indicator, which mounts on the truck and flashes a visual warning as the battery nears the discharge point. And the Exide Charge Control Unit, mounted on your charging panel, automatically controls the rate of charge, cutting the circuit and flashing a signal when the charge is complete.

Add to this ease of maintenance the improved handling performance you get with Exide-Ironclads, and it's easy to see why they help so greatly to speed up production at a saving. Why not write for details?

Exide
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BATTERIES
With Exide **MIPOR** Separators
"MIPOR," Reg. U. S. Pat. Off.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

DATE June 1939

GROUP	DEPARTMENTS	NO. HR. WKD.	HYDRAULIC OILS NO. GAL.	HYDRAULIC OILS HR./GAL.	LUBRICATING OILS NO. GAL.	LUBRICATING OILS HR./GAL.	CUTTING OILS NO. GAL.	CUTTING OILS HR./GAL.
1	J	21378						
	K	15483						
	T.R.	62044						
	L	5120						
	M&N	52514						
TOTAL		156539	159	985	1236	127	3816	41
2	X	24207			371	65.2	3816	6.3
	XX							
TOTAL								
3	P	48729	159	306	335	145	3021	16
	BSQ SMQ	35888						
	BSX							
TOTAL		84617						
4	FDY							
	HH	44664	106	420	530	840	583	76.6
TOTAL								
GRAND TOT.		310027	424	730	2472	125.8	11236	27.6
PREVIOUS MONTH	1	170058	371	459	1220	140	3816	44.6
	2	29319			530	55.1	4611	6.3
	3	86926	530	164	318	273	2173	40.0
	4							
GRAND TOT.		286303	901	318	2068	139	10600	27

Relating oil consumption to man-hours gets home the point of oil economy. If figures on this supplement to the monthly report start climbing, oil is probably being wasted

reading everything they could lay their hands on. Presently a couple of them knew a surprising amount about the qualities of different crudes, of the qualities imparted by vegetable and animal matter, of the usefulness and drawbacks of sulphur. And then they started in to do a little practical experimenting.

Guinea Pig Machines

The shop assigned them various machines on which they might specify the cutting and lubricating oils. They ran these various oils on a machine until tool failure, until a bearing heated, and so on. They put some oils out in the sun to see whether they got rancid and whether they drew flies.

The company's chemical laboratory was used for analyses. The findings were illuminating. Several oils were found to have practically identical composition and qualities. So, after a little further investigation and some research into costs, we eliminated the duplication, concentrated on one or two brands that seemed to offer the most for the money. Oddly enough, the uses to which these practically identical oils were being applied, were often very different.

Similarly, we found oils of entirely different chemical compositions and physical characteristics being used for practically identical purposes in two different departments—perhaps on identical machines doing similar jobs. Another thing we found was that we were using what might be termed an entire family of oils, all of the same general type but running from heavy to light.

The answers to these two problems required no deep thought. If two different oils were being used for similar jobs, we undertook to find out which was the better and to standardize on it. If we were buying half a dozen densities of the same oil, we cut down to two kinds—the heaviest we used and the lightest we used—and mixed the two for all our intermediate requirements.

We had been using, by actual count, eleven cutting oils. Now we have two, a base and a light. The two soluble oils were reduced to one. And the fourteen lubricating oils in use were cut down to a list of: (1) High-speed spindle oil, (2) general-purpose lubricating oil, (3) gear-box or transmission case oil, (4) hydraulic oil. Prior to the oil survey we used eleven barrels of high-speed spindle oil weekly; now, one.

As we got into the work, we found that it breaks down into three component problems: (1) Using the right kind of oil in the right place, (2) using the proper amount of oil, (3) educating the men who use oils to know why a given type is used. We found also that the most expensive oil is not necessarily the best one for a given task.

Fully as important as the type of oil is the quantity. Some authority has said that oil is not used, it is wasted. Best evidence of this is that in fully inclosed, sealed spindle bearings the original oil lasts the machine's lifetime. Our best estimate is that of the oil we purchase, 90 per cent is wasted, 10 per cent evaporates. As long as oil is used in the open atmosphere, it will evaporate, although the amount of evaporation can be radically reduced. But the big opportunity for saving comes in reduction of the percentage wasted.

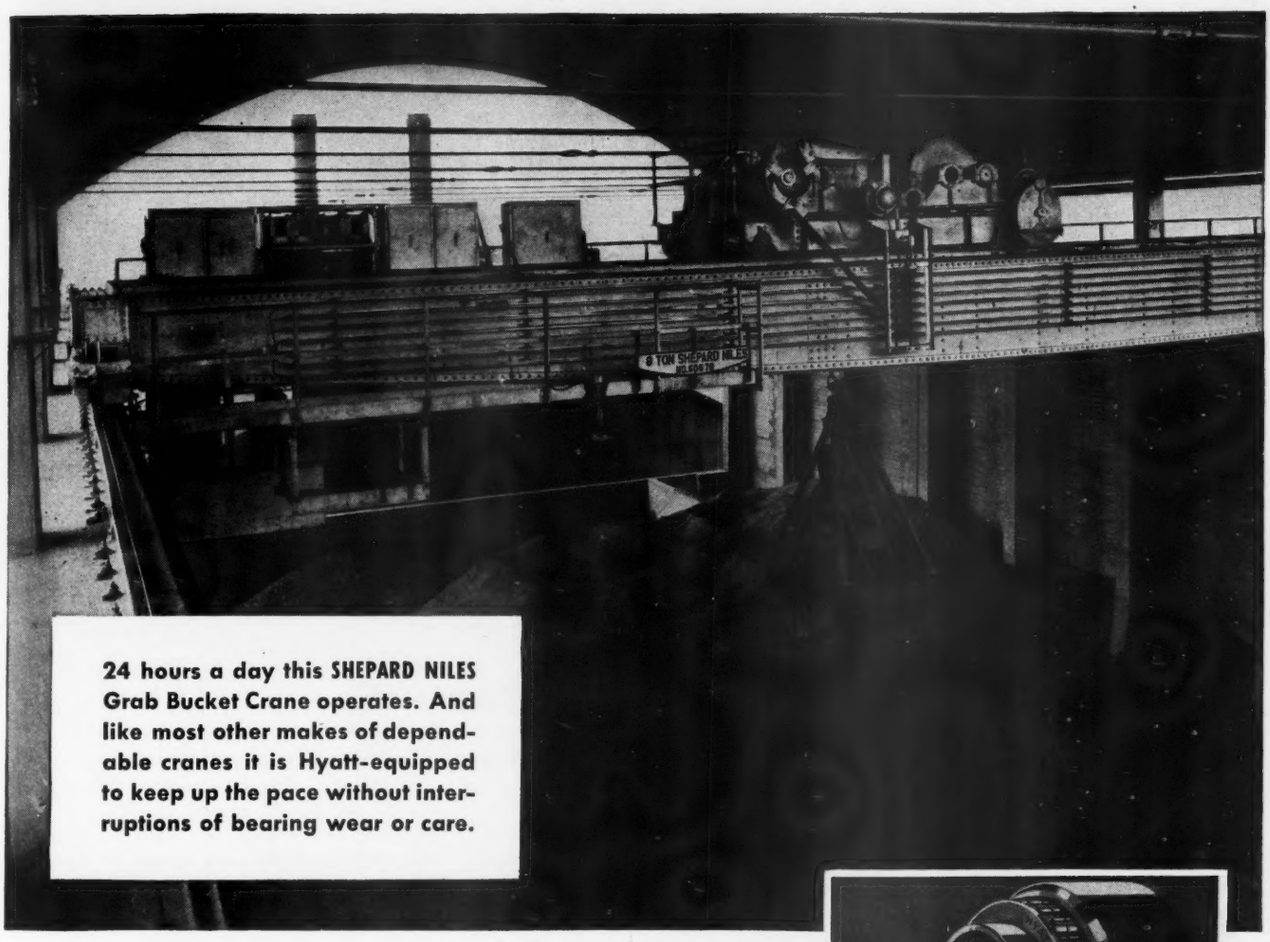
Must Know His Stuff

First line of defense against oil waste is the men who actually use the oil, the fellows who actually apply it to the bearing or the cut. We have in our entire plant 35 men whose full-time job it is to oil machines. We started our campaign by raising the standards for men to do the oiling work. Today these men are specialists in their line, and are doing a correspondingly efficient job.

Today's machine lubricator is expected to know a lot more than that he takes the stuff out of the brown drum and puts it into the turret lathe's headbox. He is expected to know why, for example, we use SAE 10 or SAE 30 in a given machine. He keeps a record of each machine on his beat. These cards are kept in the machine repair office. The lubricator takes out his day's supply of cards when his shift comes on, turns them back to the office when he goes off duty.

A card carries space for a machine's identification number, its code location, the quantity of oil used for each of several major purposes, the date, and the lubricator's remarks. He makes no note of small jobs such as filling an oilcup. But if he changes the oil in a headbox, or replaces some to bring up the level

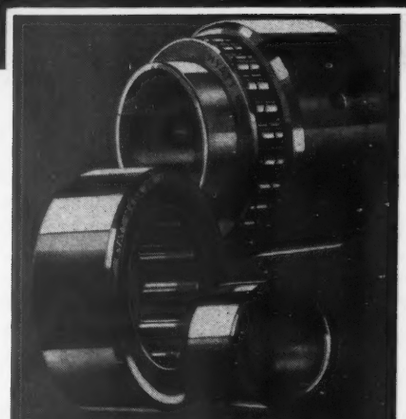
LONGER EQUIPMENT LIFE



24 hours a day this SHEPARD NILES Grab Bucket Crane operates. And like most other makes of dependable cranes it is Hyatt-equipped to keep up the pace without interruptions of bearing wear or care.

. . . Freedom from Care

On and on it goes . . . equipment of every description . . . a symphony of mechanical smoothness . . . with gears, shafts, and wheels turning silently, accurately, effortlessly on Hyatt Roller Bearings. Long-lived, carefree bearings that serve so faithfully year after year . . . that help leading builders of material handling equipment to better serve the user. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Detroit, Chicago, Pittsburgh and San Francisco.



HYATT
ROLLER
BEARINGS

in a transmission case, he notes this on the card. And if there is anything unusual about the operation, he notes under remarks, "Water getting in, had to change ahead of schedule," or, "Using 2 gallons oil daily but production doesn't want to shut down."

In a case like the latter, the lubricator probably comes in early at noon and tells his supervisor, to make sure it is not overlooked and the waste continued, and then the supervisor gets out and checks the situation, which means that production changes its mind. Short of emergencies, the supervisor is responsible for looking over the cards that are brought in by his men and noting all variations from normal. He and his men get these variations back on normal at the earliest possible moment, because this is their big job. Another way of saying it is that our 35 lubricators are in effect working on regular schedules, and have to explain all exceptions.

Back in the days when the foreman, or practically anybody else who had a preference, could specify his ideas and get his pet oil, we maintained no separate oil storehouse. With so many kinds of oil coming in from suppliers, they were delivered straight to the departments where they were used, and thereafter the oil was dispensed from the drum according to the foreman's ideas. This was wasteful, it resulted in altogether too much oil on floors, with consequent safety hazards and fire hazards.

One Man Tends Oil Stores

We now have a central oil store. To save excess handling, some drums of oil are still delivered direct to the department where they will be used. But the oil house controls these stocks, too. One man is responsible for distributing the proper kinds of oils to the proper departments. And the machine lubricator in charge of a department's oiling is responsible for using these oils properly.

In addition, he must keep continuously on the lookout for oil leaks on machines—they are easy to see because our machines are all painted a light gray—and see to it that they are fixed as soon as they appear. An oil leak is one thing we will shut a machine down for. We just refuse to have oil leaks around.

The lubricator keeps a record of the particular oils used in transmissions, and other major uses. He keeps a record of the oil he uses in general-purpose oiling. But he also keeps a close watch on how oil is treated. We used to have a good many departments where an oil drum was habitually left open from the time it was tapped until the oil was gone. Our machine lubricators today refuse to tolerate any practice whereby grit can get into oil. And they are none too friendly about anybody else getting into their oil stocks in their respective departments. Any oil removed from a drum is now kept in a cart-type portable dispenser where it stays clean and cannot slop onto the floor.

In economizing on oil use, we have shifted over from old-time oilcups to modern automatic oilers, of the two types—gravity-controlled and temperature-controlled. The temperature-controlled sight-feed oiler has oil forced out by temperature increases in the bearing, so that its oil contents typically last two or three weeks as against half an hour for the old-fashioned type. The gravity-controlled oiler pours the right amount of oil into a sump; each bearing takes just the right amount of oil that it requires.

The old oilcup used to clog up, so that machine operators formed the habit of opening them up, whereupon the entire contents would flush into the machine. This practice is unnecessary with the modern oilers. But, of course, the machine operators have not yet been fully educated out of their old habits. The new oilers save us at least 40 per cent of the total oil consumed in this type of use, as compared with the old ones. When the machine operators get educated to leave them alone and not monkey with them, the saving will probably run closer to 95 per cent.

It used to be that the management depended on the purchasing department to keep the plant supplied with sufficient oils to carry on with, depending fully on oil salesmen to see that we had the proper oils to work with. This eventually led to a large amount of different oils coming to the plant, with no definite record of how and why they were being used. With our present set-up the kinds of oils and the amounts are controlled directly from the shop. We have been pretty successful in imposing a genuine control on oils and lubrication by the various reports that are now rendered.

First is the weekly oil report, a duplicated form listing brand name, type of use, quantities on hand, average weekly use. This starts from the toolroom superintendent who is in charge of machine maintenance, goes to the factory manager, to purchasing, to the tool superintendent, to the purchasing department checker, then returns to the toolroom superintendent. By the time it has made this round, the plant management knows how our stocks compare with our use, purchasing has had a detailed look at what had better be reordered and whether for future or immediate delivery.

Next comes the monthly report. This breaks down the plant into four groups of departments, shows quantities of each type of oil used by each department in the group. If consumption is less than the previous month, the figure is in black; if more than the last month, in red. At the bottom, previous months' totals are shown for comparison.

But, because a set of consumption figures cannot tell the whole story, we supplement this. The third report charts oil consumption per man-hour by departments by groups. This really shows what is being achieved. And the results show up month after month, as the plant gets more and more thoroughly sold on the oil program.

We lose no opportunity to spread the gospel of oil conservation throughout the plant. For example, when the foremanship training conference groups prepared to take up controllable expense, one 2-week period was devoted to oils and lubrication and gasoline. During this time, the men in the oil work made regular appearances before each conference and one appearance before all of the conference leaders to assure getting the story across. And the job of making converts to a specific change somewhere out in the plant has been materially easier ever since.

A Tough Job

We cannot truthfully recommend the subject of oil and lubrication control and simplification to any plant men who are looking for an easy touch. It is a tough job, judging by our experience. Everybody who uses oil feels himself fully competent to pass on the most highly techincal matters, whether or not he knows anything about them. He is likely to balk against orders, and hold back against suggestions.

But, handled tactfully and on a basis of definite knowledge rather than hunch, an effort of this sort will eventually prevail. When it does reach this point, the savings may—as did ours—reach a figure many times greater than the total cost, with a repetition of these savings in prospect for every year that the program remains in control of the situation.

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1939 Index to

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Address the Editor

BETTER INDUSTRIAL RELATIONS THROUGH PLANNED WASHROOMS-

ELIMINATE THE "DOUBLE STANDARD"

NOT EVERY PLANT possesses such complete, well-equipped washrooms as that shown here . . . but most managements can afford them! Washrooms in any plant or office can be arranged more comfortably and efficiently by careful planning . . . without adding a cent to overhead!

Dirty, crowded washrooms often breed illness, contempt. Hidden costs of time and supplies wasted mount up needlessly.

TODAY'S PLANNED WASHROOMS create good will by providing clean, comfortable facilities for all. Progressive Management has also found they pay for themselves many times over.

Such planned washrooms are well lighted and ventilated. Sufficient basins handle rush-hour traffic without crowding. Hot water, soap and fresh, immaculate ScotTissue Towels make washing up a pleasure . . . help prevent sickness and disease.

Think what these comforts and conveniences mean to the people who work with you! Tired, often hot and dusty, they are sure to appreciate such thoughtfulness on the part of management.

USE THE SCOTT WASHROOM ADVISORY SERVICE FOR Planned Washrooms

The Scott Washroom Advisory Service is available to help you arrange plant and office washrooms comfortably, hygienically, efficiently. It will suggest how to relieve congestion, reduce waste, and cut time lost through loitering and illness. It will show you how Planned Washrooms do the two-way job of reducing overhead expense and building good will.

A Scott Washroom Survey will be made of your washrooms without obligation. Consult one of the Scott offices located in major cities or write direct: Scott Paper Co., Chester, Pa.

Copr., 1940, Scott Paper Co.

Scot Tissue TOWELS

Trade Mark Reg. U.S. Pat. Off.

MAINTENANCE SERVICE SHORTS

Readers are invited to contribute brief illustrated articles reporting out-of-the-ordinary maintenance accomplishments. Accepted articles will be paid for

BUILDINGS, SERVICES, MAINTENANCE

Scrubbers Pay Out in 6 Months

SOURCE
Finnel System, Inc.
Elkart, Ind.

Floors were formerly cleaned by hand in a large tobacco company's Richmond plant. And well cleaned, too. But the job was a costly one.

There are four floors in this building, each with 25,000 square feet of floor space, much too much for the regular cleaning crew. So every Thursday night some 70 machine operators armed with mops and brushes tackled these floors. The job lasted 2½ hours, thus involved 165 man-hours at 65¢ an hour. Average weekly cost was $113.75.

Too much, said management. So two scrubbing machines were bought. Two crews did the same job on week-ends —2 men, 12 hours, at 50¢ an hour; 6 men, 12 hours, at 30¢ an hour. Total labor cost, $33.60. Saving, $80.15 a week. The new machines paid for themselves the first six months.

The management did not stop there, however. Two years ago it entered into a rental arrangement with the scrubbing machine manufacturer whereby, without large capital investment, it gets two new machines each year to replace old equipment. The job is now being done in about 20 per cent less time with 25 per cent less labor. And the company does not have to worry about maintenance and depreciation.

•

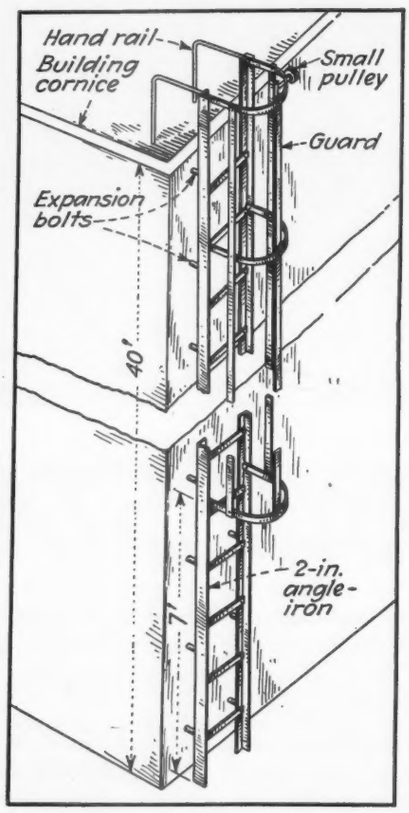
Permanent Ladder Adds to Safety and Convenience

JAMES MURPHY
Harris-Seybold-Potter Company
Cleveland

The illustration shows details of the permanently mounted ladders which we have placed at convenient points on each side of our buildings. Designed and built by the maintenance department, they have been found to be very handy when workmen have to go up on the roof.

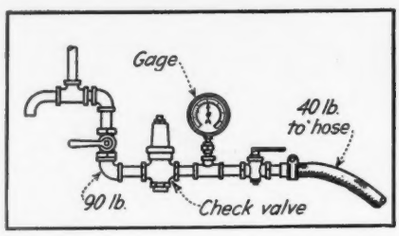
As will be seen, these ladders are built of 2-in. angle iron, and are lagged to the building wall with expansion bolts. Steps are riveted in place.

For greater safety these ladders are



provided with guards on the sides and back which make it almost impossible for anyone to fall off. These guards are riveted ¼x2-in. iron strips.

The ladders run well above the parapet and are finished off with a handrail made of 1-in. round stock. A small pulley mounted on a bracket which is bolted to the top of the ladder is a decided help in hoisting materials.



Check Valve Checks Compressed Air Hazard

R. A. SHAW
The Murray Corporation of America
Detroit

Using high pressure air of 60 to 90 lb. to blow dust out of clothing is a dangerous practice, although it is done every day in countless plants. The waste of air is costly, and danger of bodily injury is always present.

In one wood mill where this practice was going on, the superintendent had an air reducing valve installed. This valve was set at 40 lb., which is sufficient to remove dust but lessens the hazard to the body.

•

They Isolate Vibration

SOURCE
The Felters Company, Inc.
Boston

High-pressure pumps, used by a soap manufacturer for transferring heavy, semi-liquid soap from the kettles in which it is made, caused so much vibration in the production line on the floor below that the soap cakes on conveying aprons were constantly being shaken off onto the floor. To save extra handling and re-processing, it became customary to shut down the production machines that were directly below which ever one of the pumps was in operation. As it took several hours to empty any kettle, output suffered greatly.

An economical installation of vibration-isolating pads was made. The pads were put under the pump base and

3 OUT OF 4

OF THE POWER PLANT UNITS ERECTED SINCE 1935

CHOSE COAL

FOR ECONOMY, EFFICIENCY, DEPENDABILITY!

WHY THIS OVERWHELMING preference for solid fuel?

"Reliability of operation . . . low fuel cost per 1,000 pounds of steam . . . lower repair and maintenance costs," say the power engineers. "Lower cost per unit of production . . . fewer slowdowns or shutdowns," say the production men.

Three out of four—but the preference means even more when you look at the remaining 25%, for many of these aren't lucky enough to be located near sources of quality coals.

What do *you* need in coal? Higher B.T.U.? Higher ash softening temperature? Lower ash content? High or low volatile? Grindability? Greater uniformity? Somewhere along Chesapeake and Ohio — in "The Coal Bin of America" — is a bituminous coal to meet your exact requirements.

In the mines of this region, modern methods guarantee *uniformity*—of quality—of cleanliness —of sizing. In fact, from mines served by Chesapeake and Ohio you can get coal prepared and sized *to your order* . . . coal of the quality that means dependable operation.

Delivery service is equally fine. Chesapeake and Ohio's huge fleet of cars keeps coal continuously rolling to market. And working with this railroad's A-1 plant and equipment is a trained operating and service personnel, always alert to see that coal buyers get exactly what they want.

For information or assistance with fuel problems, write GEORGE H. REINBRECHT, Coal Traffic Manager, 2908 Terminal Tower, Cleveland, O.... Send for free copy of interesting brochure, "The Coal Bin of America."

CHESAPEAKE AND OHIO LINES

several of the pipe supports on both intake and output sides. The bolts that held the pump base to its concrete foundation were also isolated to prevent any "bridging."

The production line now operates without interruption; it is even difficult to determine whether the pumps are running or not.

•

Inspect and test regulators on air and gas cylinders periodically. Leaks cause waste and, in the case of gas, a hazard.

•

Single Job Repays Most of Pipe Threader's Cost

SOURCE
Beaver Pipe Tools, Inc.
Warren, Ohio

A portable pipe-cutting and threading machine was purchased by a steel company for use during the installation of a new boiler. The savings which it made on this one job paid a good part of its cost.

Since then it has been in practically constant use on all manner of pipefitting work. In addition to threading standard iron pipe it has been used with satisfactory results in threading boiler tubing. as well as monel, brass, and hard rubber pipe.

A further saving has come about through the release of a lathe which was formerly used when pipe 2 inches in diameter and larger was threaded. Now all such work is handled by the portable machine.

•

A Tool for Removing Damaged Floor Boards

JOHN E. HYLER, *Peoria, Ill.*

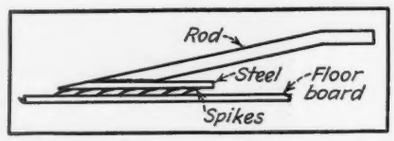
Where wood flooring of the tongue and groove type is used, maple will be found to be the best wearing. If when floors are laid, the location of traffic lanes is known, it is good practice to lay the top or finish floor in a direction diagonal to the path of travel. Rolling truck wheels have less effect on flooring so laid, because adjacent wood fibers support each other better. There is never any direct splitting action, nor is there compression directed wholly against one little set of wood fibers. Rather, it is distributed over a larger area at all times.

When wood floors of this type are to be repaired, usually only patches here and there which have been subjected to the greatest amount of wear, need to be replaced. While some make a practice of just cutting around the area to be removed, and taking out the floor as a unit, it is doubtful whether that is wise, since it leaves a continuous joint all around the square or rectangle removed. If the original staggered joints can be reestablished, a much more enduring job will be obtained. The floor maintenance tool shown here is so designed to make possible removal of floor boards in such a way that the repaired area will have these staggered joints.

Since the boards are tongued and grooved together, it is not possible to lift them out of place. They must be slid out, and in order to do this considerable force is needed. It is of no consequence, of course, how badly they may be chipped or battered in getting them out, so long as the boards left in the floor are in good condition.

To make this tool, take a piece of steel 3 inches wide and 18 inches long, anywhere from ½ to 1 inch thick, and to this, staggered at such intervals and in any formation that may be convenient, weld a number of sharp steel spikes, pointing them forward when welding them in place. Then take a piece of rod and weld it to the steel piece. This rod should be cut off obliquely at the lower end so that it can be welded in place with sufficient rise to make it comfortable to work with. The top end of the bar should be bent into a handle, making it parallel with the flat member.

By placing this tool on top of the floor board that is to be removed, and by striking blows on the end of the handle, the spikes will bite into the board, and a powerful and direct impact will be imparted to the board. In this manner, an area can be quickly prepared for new floor boards.



In placing the new boards, the tool will not be used of course, nor will it be necessary, for one can tap the boards on their ends to get them into place. If a tight fit makes them hard to get into place, a little oil, grease, or floor wax can be applied to the tongues and grooves.

MECHANICAL POWER TRANSMISSION

Better Conveyor Lubrication Stopped Inspectors' Headaches

SOURCE
Acheson Colloids Corporation
Port Huron, Mich.

Two continuous chain-driven conveyors carrying spark plug insulator "decorating setters" up to and away from an 1,800-deg. F. kiln gave rise to a lubrication problem at the plant of the Champion Spark Plug Company, Ceramic Division, Detroit. Driven by a 2½-hp. motor, the slow-moving conveyors, when first installed, had a tendency to move in small jerks rather than smoothly. Headaches, of which inspectors sitting facing the conveyors complained, were suspected of being traceable to this motion.

The conveyors are fitted with flat plates, designed to support special

Conveyors, shown here moving away from the ovens, now operate smoothly, without jerks

Frozen fish are fresh fish—but let the refrigeration compressor break down and instead of food you have fertilizer!

One of America's large fisheries was jeopardizing tons of fish, thousands of dollars—due to ice machine compressor breakdown and shutdowns. Inferior lubricating oils were sticking valves, making the machine unreliable.

Sun took up the problem. Soon, thanks to Sun Oil Company's "Solnus Oil—Light," this same compressor was setting a record—gave uninterrupted performance for fifteen months when inspection showed excellent condition throughout.

Such performance is typical of Sun Oils. Their purity, quality and economy, made possible by Sun Oil Company's exclusive methods of refining, means a saving for manufacturers that you should cash in on.

Write us today about your lubrication or processing problem.

SUN OIL COMPANY
1608 Walnut Street, Philadelphia

SOLNUS OIL SOLVED THIS PROBLEM!

SUN OILS

PETROLEUM PRODUCTS FOR ALL INDUSTRIES

nickel-iron trays loaded with the insulators. These plates slide on horizontal guide plates on both sides of the conveyor—from loading stations through the kiln and back through a cooling zone to final inspection, where insulators are removed and trays reloaded.

Normally, conventional lubrication of the guides might have taken care of the situation. Two factors, however, obviated the use of customary oil or grease lubrication: (1) Grease or foreign matter could not be permitted where it might get on the ware, and (2) conventional lubricants would burn off, carbonize, and flake as the red hot setters were carried from the kiln to the cooling chamber.

The problem was solved by installing, at a point just beyond where the conveyor leaves the kiln, two automatic lubricators of the air-operated spray type which spray colloidal graphite suspended in carbon tetrachloride directly on the lower bearing surfaces and chain links of the conveyors as the plates pass over the lubricator.

Since at this point the conveyor has a temperature of around 375–400 degrees F., the carbon tetrachloride evaporates almost instantaneously, leaving a coating of dry graphite on the wear surfaces. A small amount of kerosene and oil is added to the carbon tetrachloride to slow up evaporation slightly—to allow the graphite to cover the bearing surfaces completely and lubricate them.

When first installed, the automatic lubricator was operated periodically during the day. Since then, it has been found that operating it for a short period once a day is adequate to maintain complete lubrication, as the graphite adheres firmly to the surface to give satisfactory 24-hr. lubrication.

The resulting smooth operation of the conveyor was accompanied by a sharp drop in headache complaints—and, incidentally, also reduced power consumption materially.

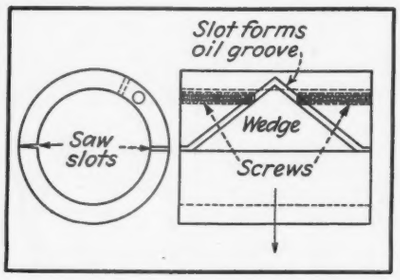
Bushing Inserted Without Removing Pulley from Shaft

W. H. Moore, *Leeds, England*

A loose pulley that required rebushing was found to be in a position that made its removal impossible without dismantling the machine. It was decided, therefore, to make a split bushing and leave the pulley on the shaft.

The old bushing was driven out of the pulley and saw cut in two to get it off the shaft. The new one was first sawed in half in the ordinary way, but as it was necessary to tighten it inside the pulley bore, the following method of putting it in place was adopted.

In one side of one-half of the bushing



a wedge-shaped piece was sawed out. Two holes were drilled from the ends of the bushing to break through near the apex of the wedge opening. These holes were than tapped.

When the bushing was placed on the shaft and slid into the pulley bore, these screws were screwed as tight as possible, sawed off, and riveted over. It can be seen that tightening these screws forced the wedge over and tightened the bushing securely inside the pulley.

We used the triangular slot resulting from the wedge cutting as an oil groove, and by running the pulley in the direction indicated by the arrow the oil was kept in.

ELECTRICAL UTILIZATION

Condensers Cured Starting Trouble With Small Motors

Norman C. Müller, *Oberlin, Ohio*

In a plant that operates a number of split-phase motors of 1/20- to 1/10-hp. rating, at least one of these motors was out of order most of the time. Much of the trouble was caused by sticking of the starting or centrifugal switch due to dirt or other causes.

Since these motors were lightly loaded and started easily, we removed the centrifugal switches and connected small paper condensers across the switch leads. The correct size of condenser for each motor was determined by trial. We connected an ammeter in circuit with the motor and selected a condenser that gave us an ampere reading slightly under the nameplate rating. While the motor was running under normal load, both motor and condenser were checked for heating. If either overheated, we decreased the condenser capacity slightly.

We found that condensers of 0.5 mfd. capacity worked best on the 1/20-hp. motors, whereas the 1/10-hp. size required 4.5 mfd. The ampere load is less with the proper size of condenser connected across the starting leads, than when only the running winding is connected. This is due to the corrective effect of the condenser.

If a motor operates in an unusually warm location, it is advisable to put the condenser in as cool a place as possible, rather than on the motor.

•

Kink Detector Prevents Damage to Machine

Source
Photoswitch, Inc., Cambridge, Mass.

A wire and cable plant in Rhode Island is saving idle time on the wire-drawing machines through the use of a phototube control for detecting kinks.

Copper wire from a coil located about 30 feet from the wire-drawing machine is passed over an iron bar to be straightened, and then goes to the machine. Formerly a kink would occasionally ride unnoticed over the bar and to the machine, causing a shutdown and possibly damage to the mechanism. By locating a phototube above the bar in a position slightly above the normal travel of the wire, any kink is instantly detected and the machine is stopped.

This installation has also proved valuable as a safety device. A workman attempting to straighten out a kink might become entangled and suffer injury. Now if anything other than a straight wire passes above the wire, the control stops the machine.

•

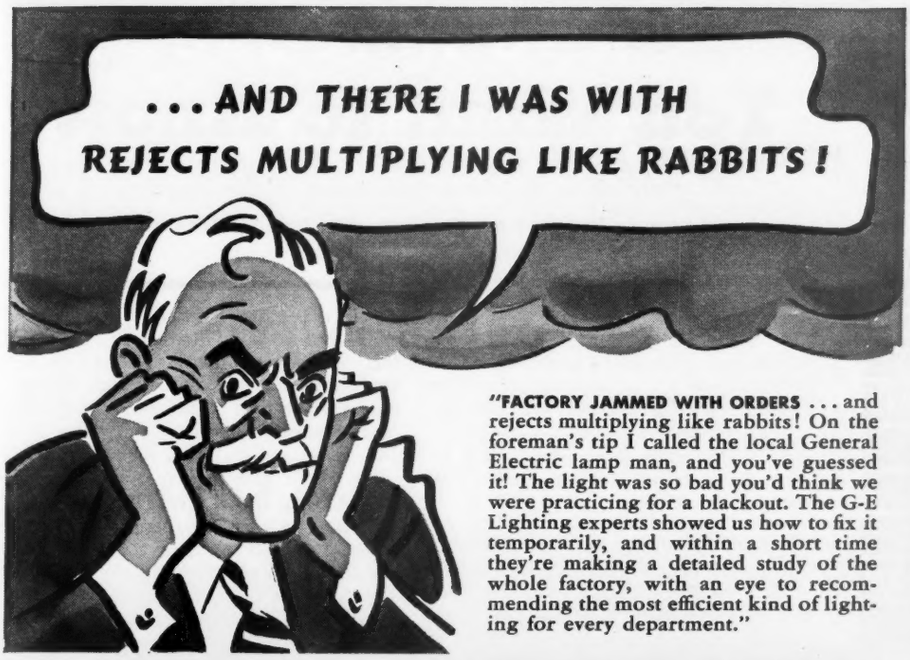
Cover Drains Water Out of Junction Box

H. Sauvé, *Temiscaming, Que., Canada*

Preventing the entrance of moisture-laden air into ducts is sometimes more difficult than might be supposed. When the moisture condenses out and water collects there is likely to be trouble.

In spite of all we could do, trouble occurred in some departments of a large paper mill from condensation collecting in junction boxes which were closed tightly. To permit the water to drain off we eventually made heavy galvanized-iron covers to replace the existing flat covers on the boxes. These covers were formed to give them a slight pitch toward the center and provided with four grooves and a drain hole. Over the drain hole we put a baffle plate to prevent, so far as possible, steam from going directly up into the junction box, and to help condense it.

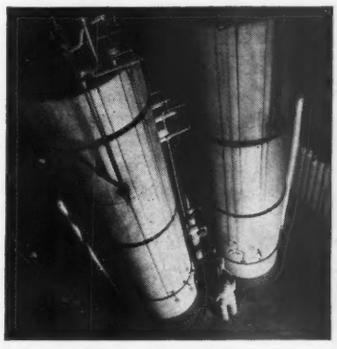
This plate was simply a piece of galvanized iron with the sides bent down to raise it a short distance above the cover. Baffle and cover were coated on the inside with a bituminous paint.



"FACTORY JAMMED WITH ORDERS . . . and rejects multiplying like rabbits! On the foreman's tip I called the local General Electric lamp man, and you've guessed it! The light was so bad you'd think we were practicing for a blackout. The G-E Lighting experts showed us how to fix it temporarily, and within a short time they're making a detailed study of the whole factory, with an eye to recommending the most efficient kind of lighting for every department."

WITH GOOD GENERAL LIGHTING in a plant, machines and benches can be arranged or rearranged for the most efficient plant operation. The above photo shows a good lighting installation in the plant of the Iron Fireman Manufacturing Co., Cleveland. This plant uses 300 watt G-E MAZDA lamps in RLM dome reflectors, spaced on 11-foot centers, to provide good light for safe seeing and more efficient work. Use the new, brighter G-E MAZDA lamps in your plant.

304° BELOW ZERO . . . The two tanks shown here contain argon, the inert gas used to help make incandescent G-E MAZDA lamps stay brighter longer. The drier the argon, the more efficient the lamp. Moisture in the argon is frozen out with liquid air at a temperature of -304° F. This year's G-E MAZDA lamps give more light because they contain a higher percentage of this drier argon. This process is only one link in the chain of General Electric research and development that is making each year's G-E lamps give more light for the current consumed. General Electric Company, Dept. 166-F-B, Nela Park, Cleveland, O.



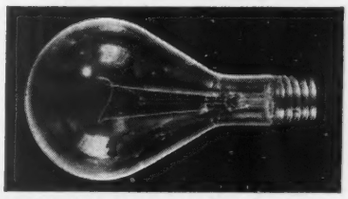
G-E MAZDA LAMPS

GENERAL ELECTRIC

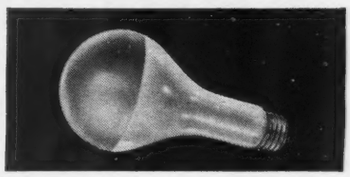
Made to stay brighter longer

G.E. MAKES 9000 DIFFERENT LAMPS *for every* LIGHTING PURPOSE

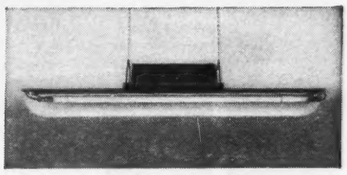
Whether you make waste baskets or silk hose, G.E. is the place to go for help on making your lighting a real aid to production. Because G.E. makes more than 9000 different types and sizes of lamps, our lighting experts can give you an unbiased recommendation on exactly which ones you need and where.



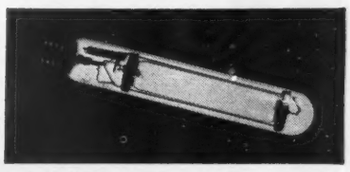
G-E MAZDA lamps fulfill most industrial requirements for general lighting service. They are made in sizes from 15 up to 1500 watts.



G-E SILVERED BOWL MAZDA lamps are standard incandescent lamps with a coating of "mirror" silver on bowl. For soft indirect lighting . . . in proper fixtures or adaptors.



RF 85 WATT (COOPER HEWITT fluorescent) lamps—100 watts overall—give the greatest light output of any lamp of equal wattage. Long life . . . low operating cost . . . less maintenance.



G-E MAZDA H (mercury) lamps . . . 400 watt size shown . . . have high efficiency, long life, and ruggedness. Very practical for high bay areas. Often used in combination with filament lamps.

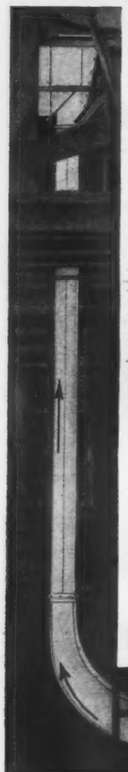
NEW G-E "MIDGET SUN", a 1000-watt, water-cooled mercury lamp, is brightest ever made. It is 1/5 as bright as the sun's surface, yet no bigger than a cigarette.

The 1 Conveyor-Elevator That..

- PREVENTS BREAKAGE—
- BOTH CONVEYS AND ELEVATES IN 1 UNIT—
- REQUIRES ONLY ¼ THE USUAL SPACE—
- IS DUST-TIGHT—
- ELIMINATES FEEDERS—
- MINIMIZES EXPLOSION HAZARDS—

REDLER

CONVEYOR-ELEVATORS



Practically *any* pulverized, granular, small lump or flaky material can be conveyed and elevated in required direction *more safely* and *at lower cost* in REDLERS. Only REDLERS offer you all of the above advantages. Stephens - Adamson, pioneers in *all types* of bulk Material Handling Equipment, can give you *unprejudiced* recommendations on your next job. Write us!

Section thru a REDLER

MANY SHAPES AVAILABLE

L-type REDLER Conveyor-Elevator in process plant.

FREE TO INTERESTED USERS OF MATERIAL HANDLING EQUIPMENT— 40-page engineering Handbook on REDLERS sent on request. Write!

STEPHENS-ADAMSON MANUFACTURING COMPANY
1 RIDGEWAY AVE.
AURORA, ILLINOIS

You Want to Know

more about the items mentioned on this page.
Letters to the addresses given will bring information

• MOLDED PLASTIC CASE gives a new flashlight one of the smartest streamline appearances we've seen, and it's non-warping, non-inflammable, and non-conductive too. Novel feature is a storage space for spare bulb. Gits Molding Corp., 4600 Huron St., Chicago.

• COUNTING, sorting, weighing, measuring, signalling, are some of the functions of Type RQ photoelectric relay that operates on a change of 40 foot-candles if the general illumination is not more than 15 foot-candles. Increased sensitivity is obtainable by means of a condensing lens. Westinghouse Electric & Mfg. Co., East Pittsburgh.

• CEMENTS, of high bonding strength, are particularly applicable in making joints between rubber and metals. Synthetic resins, woods, and ceramics can also be joined with these thermoplastic materials, which resist cracking by bending, shock, or variations in temperature. The B. F. Goodrich Co., Akron.

• PRINTING MACHINE that almost anyone can operate, turns out safety signs, posters, and circulars in one or more copies, in one or a dozen colors, and in one operation. Line-O-Scribe Division, Globe Corp., 332 South Michigan Ave., Chicago.

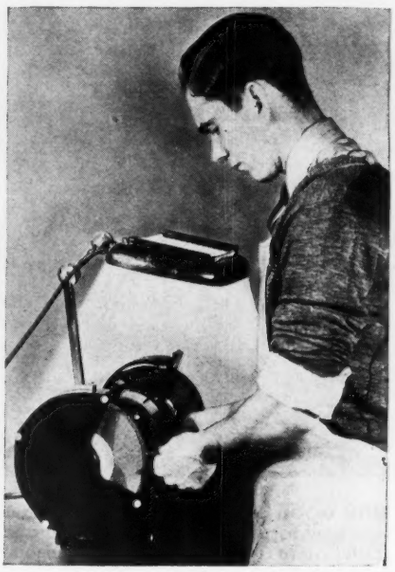
• TWIST OF THE HANDLE sends a V-type squeegee in the desired direction to clean up water, slush, or snow collected in corners, under benches, in hollows on floors or surfaced yards. Available in three sizes, it has reversible, double-edged, tapered rubber blade. G. H. Tennant Co., 1821 Marshall St. N. E., Minneapolis.

• FILTER PAPER for filter presses is made with long fibers and subjected to a special treatment to give it high wet strength, which, it is said, obviates any danger of tearing the paper in placing it on or removing it from the canvas. The Enthone Co., 442 Elm St., New Haven, Conn.

• WHERE TIME AND MONEY can be saved in machinery maintenance, emergency repairs, replacing or rebuilding worn parts, is shown on a series of handy cards entitled "Welding Hints." Each card has one problem and its solution. Harnischfeger Corp., Welding Division, Milwaukee.

• PEELING POTATOES without a knife is one of many processes described in a booklet showing applications of controlled gas-heat equipment to industrial processing. Other applications described include wire drawing, stainless strip annealing, superheating steam, brazing turbine blades, stress relieving. The Selas Co., 18th St. at Indiana Ave., Philadelphia.

• PLATING RACK COATING comes in tape form. A synthetic thermoplastic, it is resistant to all cleaning, pickling, and plating solutions commonly used, including chromium and bright nickel. Hanson-Van Winkle-Munning Co., Matawan, N. J.



GRINDER SHIELD features shatterproof glass that is interchangeable with magnifying lenses for close work. Bayonet-type lamps, set flush in the plastic frame, focus light on the work. Coverplate glass protects lenses from pitting. The Boyer-Campbell Co., 6540 Antoine St., Detroit

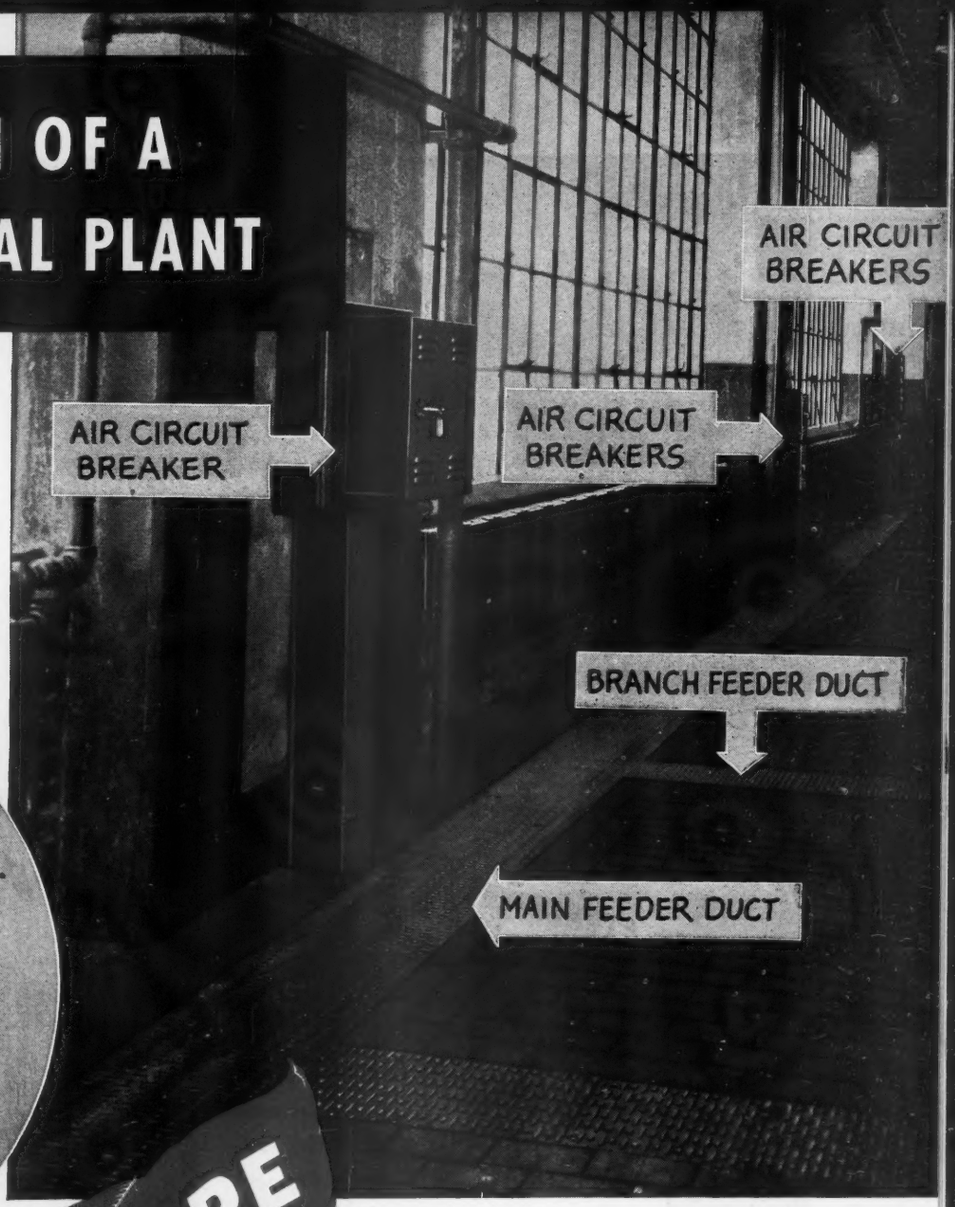
• JOINT-SEALING COMPOUNDS expand under heat to assure tight joints in the assembly of threaded and flanged connections on pipe lines, and equipment carrying high-pressure steam, compressed air, oil, and solvents. Macksons Co., 125 Cedar St., New York.

• SELF-LOCKING NUT is designed for most severe vibration conditions. A one-piece nut, it fits standard bolts and can be used many times. Boots Aircraft Nut Corp., Waterbury, Conn.

• SOUND AND SILENT FILMS available on loan from the General Electric Company, Schenectady, N. Y., for indus-

THE SURE SIGN OF A MODERN INDUSTRIAL PLANT

Air Circuit Breakers on All Main and Branch Feeders



He's not afraid. He knows it has plenty of "I C"

"I C" = Interrupting capacity

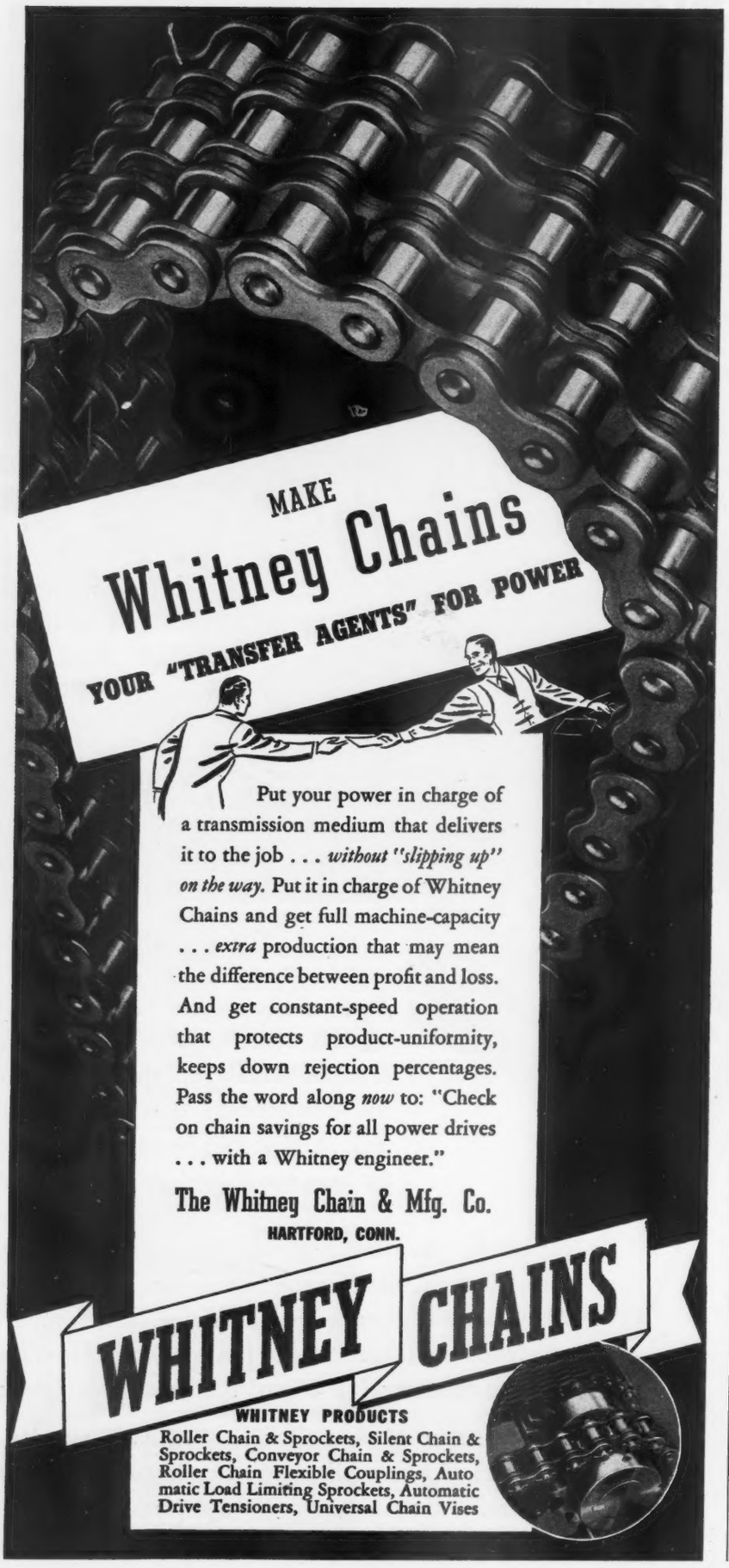
G-E air circuit breakers are available with interrupting ratings up to 80,000 amperes. You can depend upon getting the specified rating whether the breakers are mounted separately or as factory-assembled boards. If you have any question about how to determine the interrupting capacity needed, in order to know the size of circuit breaker to use, get in touch with the nearest G-E office.

THE severity of a short circuit depends largely on the capacity of the transformers that feed the circuits, and it can *not* be determined by the normal load on the circuit. As plant loads have grown, transformer capacities have been materially increased. Therefore, short circuits present an ever-increasing hazard. They seriously endanger personnel and property wherever the power supply has outgrown the interrupting capacity ("I C") of the protective devices.

Are you sure of your "I C"? With G-E air circuit breakers of *known* interrupting capacity, you *can* be sure.

GENERAL ELECTRIC

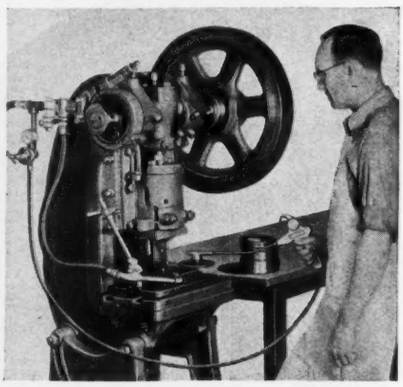
890-79


MAKE
Whitney Chains
YOUR "TRANSFER AGENTS" FOR POWER
Put your power in charge of a transmission medium that delivers it to the job . . . *without "slipping up" on the way.* Put it in charge of Whitney Chains and get full machine-capacity . . . *extra* production that may mean the difference between profit and loss. And get constant-speed operation that protects product-uniformity, keeps down rejection percentages. Pass the word along *now* to: "Check on chain savings for all power drives . . . with a Whitney engineer."
The Whitney Chain & Mfg. Co.
HARTFORD, CONN.
WHITNEY CHAINS
WHITNEY PRODUCTS
Roller Chain & Sprockets, Silent Chain & Sprockets, Conveyor Chain & Sprockets, Roller Chain Flexible Couplings, Automatic Load Limiting Sprockets, Automatic Drive Tensioners, Universal Chain Vises

trial and educational purposes, are listed in the company's catalog GES-402F. Among the classifications: Science, generation and distribution of electricity, transportation, electric equipment, industry, welding, lighting.

• CEMENTED CARBIDE can now be produced in tubing, spirals, and round or shaped bars by an extrusion process which forms it in lengths up to 20 inches and outside diameters of 0.015 to ⅜ inches. A supplementary process permits bending the rods into rings and other shapes. Carboloy Co., Inc., 11185 East 8 Mile Road, Detroit.

• TWO EXPERIMENTS on the effect of radiation on wet-bulb and dry-bulb thermometers are reported in a bulletin, "The Effect of Radiation on Psychrometric Readings." 60c. Engineering Experiment Station, Cornell University, Ithaca, N. Y.



FAR, FAR AWAY from the danger zone are the operator's hands as he uses this safety press feeder. With its vacuum cup, operated, strangely enough, from a 20-45-lb. compressed air line, it picks up wet, or dry flat-surface materials so long as pressure on trigger of the pistol-grip handle is maintained. F. J. Littell Machine Co., 4171 Ravenswood Ave., Chicago

• GLASS, though transparent, filters light and retards aging of documents placed under it. Constructed like a sandwich of three layers of glass and two of plastic, it is resistant to blows and filters out ultra-violet rays. Pittsburgh Plate Glass Co., Pittsburgh.

• ANNUAL SCHEDULE of American shows and exhibits is ready for 1940. Price $5. Exhibitors Advisory Council, 120 Greenwich St., New York.

• CHAIN DETACHER is a simple tool that enables one to bring chain links into position with one hand while the other hand uses a hammer to knock the links apart. Link-Belt Co., Indianapolis.

• ISOPHORONE is a new chemical suitable as a solvent for resins (including the Vinylite type), oils, fats, and gums. Likely uses are in preparation of printing inks, finishes, dyestuffs, and lacquers. Carbide & Carbon Chemicals Corp., 30 East 42d St., New York.

"SAY JOE, THAT NEW MACWHYTE SLING HANDBOOK IS THE BEST I'VE SEEN IN YEARS!"

HERE IT IS!

NEW 56-PAGE COMPREHENSIVE HANDBOOK ON SLINGS

...PREPARED FOR SAFETY MEN, SUPERINTENDENTS, ENGINEERS, PURCHASING AGENTS...

Filled with practical information

Now for the first time this handbook is available, without obligation, to all those responsible for operation or maintenance work involving slings.

This is no ordinary handbook. Our engineers and field men spent many months getting together photographs, accurate tables, and information on the latest designs and improvements in slings.

Here are just a few of the things you will find in this handbook:

Capacity and weight comparisons of slings, wire rope, and chain. • Safe working loads for Atlas, Monarch, and Drew Slings. • 66 Photographs of Slings and Fittings. • Typical Assemblies. • Crane Signals. • Breaking Strength and weight comparisons. • Sling fittings (hooks, thimbles, shackles, links). • And many, many more pages of useful information.

How To Get Your Copy: Simply ask for Handbook S-6 on your company's letterhead and give your title.

NO. 446

MACWHYTE BRAIDED WIRE ROPE SLINGS are known to industry as THE Safety Sling.

They are made from endless right lay and left lay ropes which are spirally interwoven to form a round sling body.

The extreme flexibility of the sling permits it to hug the contour of the load, assuring a full gripping contact when the lifting power is applied, thus preventing slippage. These features make the sling easy to handle and safe to use.

Send your sling inquiries to MACWHYTE!

MACWHYTE ATLAS

Braided WIRE ROPE Slings

MACWHYTE COMPANY, 2920 Fourteenth Ave., Kenosha, Wis. • Manufacturers of Wire Rope and Braided Wire Rope Slings. Distributors throughout the U. S. A. New York . . . Pittsburgh . . . Chicago . . . Ft. Worth . . . Portland . . . Seattle . . . San Francisco

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Production and profits depend on healthy hands. Formula SBS-11, the modern industrial skin cleanser, keeps hands clean, chap free and efficient. Quickly removes grease, grime and bacteria. Helps prevent infection, skin irritation and dermatitis. 3210 plants now supply Formula SBS-11 to their employees. Costs less than 1¢ per week per worker. Cut off, sign, and mail the attached coupon today for liberal FREE TRIAL SUPPLY of Formula SBS-11. Sugar Beet Products Company, 300 Waller Street, Saginaw, Michigan.

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We Have..... Employees
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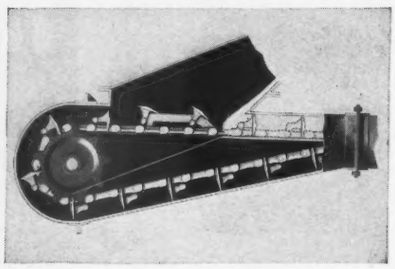
What's New in Equipment

Elevator-Conveyor

The Mass-Flo elevator-conveyor, handling granular materials such as cereals, coal, sawdust, soap chips, soy bean meal,



chemicals, consists of a steel casing through which solid pivoted flights spaced at intervals on a single strand of chain move the material horizontally or vertically in a solid mass or with partial load. A tripper discharges the flights of their load. The unit is said to feed and discharge at any point, and to be self-feeding and self-cleaning. The Jeffrey Mfg. Co., Columbus, Ohio.

Closing Relay

Type HKA pump-free control relay, for oil circuit breakers equipped with "cut-off" switches, consists of two elements: The operating element picks up and closes its main contacts for the closing solenoid and at the same time seals itself in; the auxiliary element is energized by a solenoid "cut-off" switch closed by the operation of the solenoid mechanism. An Alnico blow-out magnet, that produces a magnetic field independent of the current in the arc, is said to provide strong blow-out action at low arcing current without excessive blowout at high current. General Electric Co., Schenectady, N. Y.

Projection-Type Heater

Heater, for ceiling suspension, uses a propeller fan and draw-through arrangement permitting large heating areas in a 4-side element, and a specially shaped discharge nozzle for directing the heat. John J. Nesbitt, Inc., Holmesburg, Pa.

Welding Blowpipe

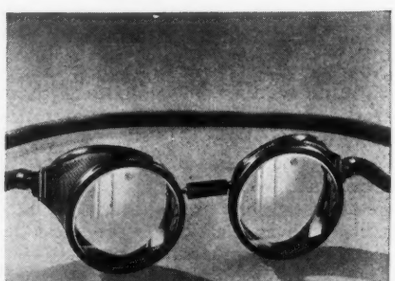
Welding blowpipe, W-29, uses low- or medium-pressure acetylene to weld light-gage metal up to 3/8 in. thick. Weighing 15 oz., it is handy for inaccessible work. Both valves, adjustable by thumb and forefinger, are located at the forward end of the handle. Features: "Pencil-point" welding flame; "packless" valves and valve stems protected against knocks; small-size screw-type hose connections on the handle for use of 3/16-in. hose; 8 welding heads, each with built-in injector and available in one-piece and two-piece tip styles. The Linde Air Products Co., Unit of Union Carbide and Carbon Corp., 30 East 42d St., New York.

Stock-Bin Lighting

To fully light stock-bin interiors from top to bottom shelf, the Stock-lite has been designed with curved V-shaped flanges which direct the light to the sides. Finished in white porcelain enamel inside and out, it is said not to be affected by atmospherc conditions. Available with pendant, right-angle, feed-through, or outlet-box mounting. Goodrich Electric Co., 2900 North Oakley Ave., Chicago.

Coil Winder Drive

Model 210 is equipped with a variable-speed transmission that has sealed ball bearings and V-belt drive; 110-volt, 60-cycle, 1/3-hp. motor; foot pedal controlling starting, driving, stopping speeds from 120-650 r.p.m. (Neutral position permits hand winding.); automatic revolution counter recording by addition and subtraction the total number of turns; pilot light indicating when the motor is running. Measures 48 in. high by 24 in. wide by 18 in. deep. Ideal Commutator Dresser Co., 1416 Park Ave., Sycamore, Ill.

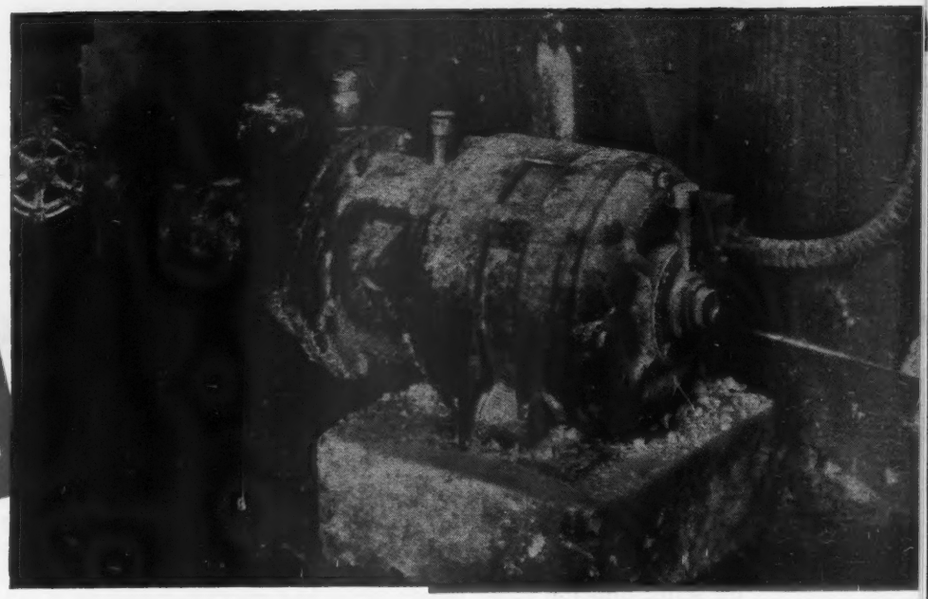


Safety Goggle

Safety goggle features a headband consisting of a spring and ball chain covered by cloth sleeving. The chain is said to prevent over-extension of the spring yet permit instant adjustment to any head size. The eyecups are molded of light-

NO PLACE FOR WEAKLINGS!

Here's an Amazing True Story of How 17 Allis-Chalmers Lo-Maintenance Motors Proved Their Low Maintenance Costs! Get the Facts on Full Measure Protection in Lo-Maintenance Motors, on the Savings It Means to You!



Another true case history from the Allis-Chalmers files that proves **"IT PAYS TO BUY THE EQUIPMENT THAT PAYS FOR ITSELF!"**

Operating where dust filled the air . . . fine chemical dust that bit like acid . . . that's a cruel test for any motor to pass! But it's the kind of test that brings out motor differences that might otherwise take months of normal operation to show up! And it's the kind of test that gives Allis-Chalmers Lo-Maintenance Motors a chance to prove their Full Measure Features!

There were 39 motors on the job in this large Southern chemical plant — 17 Allis-Chalmers and 22 of six other makes. All were operating under the same adverse conditions. But here's what the officials of the chemical company discovered when they checked repair and maintenance costs after two years of service!

For the 22 motors of other makes, the total upkeep cost was more than $500.00! But for the 17 Allis-Chalmers motors, the total repair bill was the sensationally low figure of $17.30!

Orders 18 More!

That's the reason this company ordered 18 additional motors . . . made Allis-Chalmers first choice in their plant! And that's the reason Lo-Maintenance Motors are fast becoming first choice in hundreds of plants throughout the country!

For when you buy a Lo-Maintenance Motor, you get more than a motor that delivers just a rated horsepower. You get a motor that has built into it the results of Allis-Chalmers' 90 years of advancing with industry . . . of making motors to meet the rigid requirements of their own famous line of heavy duty industrial equipment.

LOOKS BAD, DOESN'T IT? BUT THIS Allis-Chalmers Lo-Maintenance Motor—like the rest of the original 17 in this chemical plant — is still running as perfectly as the day it was installed . . . giving dependable daily service in motor-ruining chemical dust.

High carbon steel frame . . . indestructible rotor . . . husky all-around construction with no skimping materials . . . add them together and you get a motor that's built for long life . . . without running up costly repair bills!

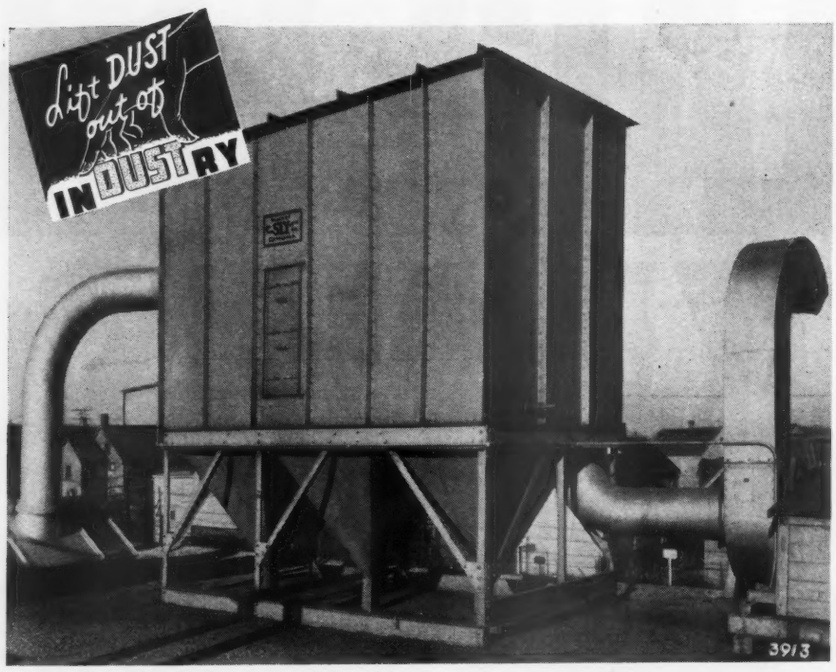
Get the Full-Measure story on Lo-Maintenance Motors. Call the nearest Allis-Chalmers district office or write direct to Allis-Chalmers. Find out how you can cut maintenance . . . keep production steady . . . with Allis-Chalmers Lo-Maintenance Motors!

1030

Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN



★ *Sly Dust Filter on roof at plant of Ohio Carbon Company, Cleveland, Ohio.*

Ten Years of Savings

WITH THIS SLY DUST FILTER

★ Ten years ago, The Ohio Carbon Company, manufacturers of carbon brushes, installed this Sly Dust Filter to—

Protect health of workmen
Keep the plant cleaner
Effect savings in production.

Today, the filter, after continuous use, is giving thoroughly satisfactory service. It has improved the morale of the workmen. It reclaims both copper and carbon. The former is sold as scrap and the latter (when there is a market for it) as a low grade carbon.

The Sly Dust Filter has meant important savings to Ohio Carbon—in one year alone when using carbon reclaims they saved about 20% of the cost of the filter.

This is but one instance of hundreds where Sly Dust Filters in many lines of industry are eliminating the dust nuisance, providing health protection, reducing accident hazards, making cleaner plants and saving money. The accumulated experience of 65 years is at your disposal when you have a Sly man on your particular problem. Use the coupon for *Guide to Dust Control.*

THE W. W. SLY MFG. CO.

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4755 Train Avenue Cleveland, Ohio

W. W. SLY MFG. CO., 4755 Train Ave., Cleveland, Ohio.
Please send me *Guide to Dust Control.*

Name .....

Address .....

Product Manufactured .....

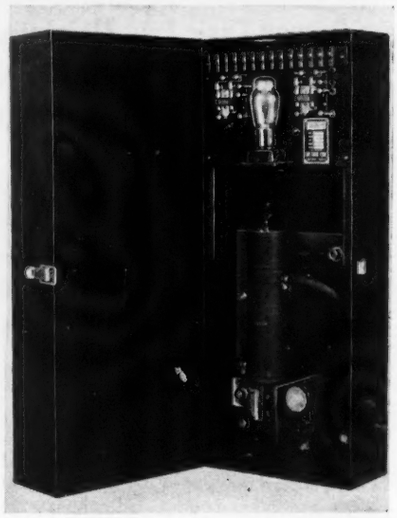
weight material that is water-, oil-, grease-, and perspiration-resistant, and can be sterilized without harm, it is claimed. They are low set to provide wide angle vision and have metal screens on the sides for ventilation. American Optical Co., Southbridge, Mass.

Grinder and Sander

Vertical-type portable grinder and sander, for use on flat surfaces, concrete floors, walls, and ceilings, has 2 side handles to provide a secure grip. It drives a cup grinding wheel, scratch brush, sanding and polishing pads, and can be used for cleaning copings, sills, steps, and trim. Has an aluminum alloy body, a ball bearing universal motor, and weighs 18 pounds. Wodack Electric Tool Corp., 4627 West Huron St., Chicago.

Weld Timer

Ability to control welding time to a half-cycle of current on any resistance welder is the claim made for Model 90-1



weld timer. It is recommended particularly for welding thin section stainless steel, aluminum, brass screen, copper lugs, and other applications where high heat and close control of welding time are essential. Consists of two moving parts (relays) and one electronic and one rectifier tube. The relay closes on the minus half-cycle permitting the timer to fire on the positive half-cycle. Available in 220-550 volts, 25, 50, and 60 cycles, 150-600 amperes. Weltronic Corp., 2832 East Grand Blvd., Detroit.

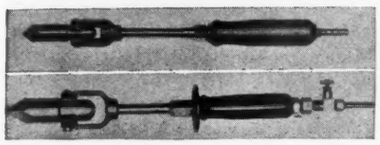
Variable-Speed Drive

E-M Magnetic Drive consists of two rotating parts—a flux linkage ring and a magnetic flux producer. The ring is driven by the driving motor; the magnet revolves within the ring and drives the load shaft. Mechanical torque connection between ring and magnet is eliminated. Torque is transmitted by electromagnetic forces through an air-gap separating the ring and magnet. Particularly suited to operation of boiler draft fans and centrifugal pumps, the drive is placed between

the constant-speed driving motor and the load, and is applicable to new or existing installations. Speed is controlled by a control-current rheostat knob. The slip loss in operation is dissipated in the ring member of the drive. Electric Machinery Mfg. Co., Minneapolis.

Soldering Irons

Two open-flame-type soldering irons have been designed with the air-acetylene



flame as an integral part of the soldering iron, so that a constant source of heat without interruptions to reheat the copper can be had. The small iron is suited for automotive, electrical, telephone switchboard, and radio work; the standard irons handle heavier operations. Both are furnished with pointed-type coppers—chisel-type for the small iron, chisel- and hatchet-types for the standard iron which can also be supplied with a needle valve to permit exact regulation of the flame. Features claimed: Stable flame; soldering coppers that can be heated and reforged without affecting heating efficiency; bolt and nut to hold the tip securely in the iron. The Linde Air Products Co., Unit of Union Carbide and Carbon Corp., 30 East 42nd St., New York.

Faceshields

Faceshields affording protection against hot sparks, chemical splashes, flying grit, and dust are available in 3 models—without sparkshield, with semi-sparkshield, with full sparkshield. Headgear of moisture-resistant fiber features "head-line" design preforming the headgear to the contours of the head; three-way adjustment with top strap that supports the headgear from the top of the head; leather sweatband; adjustable visor; aluminum binding around entire edge of visor. The plastic visor is available in 4- and 6-in. sizes. Mine Safety Appliances Co., Braddock, Thomas, & Meade Sts., Pittsburgh.

Conveyor Bearing

Type CB-504 conveyor bearing is "lubricated-for-life" and protected from dirt by a dual seal. Design of bearings and stub shafts eliminates need for adjusting nuts, springs, collars, long through-shafts; assures self-aligning action to prevent binding without possibility of the ring turning upon the shafts; and makes for ease in setting up conveyor units in the field, it is claimed. New Departure, Division of General Motors, Bristol, Conn.

Centrifugal Pump

Combining a centrifugal pump with an inclosed electric motor within a single frame permits predetermined operating

FLEXIBLE SHOP ARRANGEMENTS WITH "HALLOWELL" STEEL WORK-BENCHES

Here's a model that permits maximum flexibility . . . just grab the handles and trundle the "Hallowell" Semi-Portable right to the job. Swing handles out of the way and it settles down to a rigid, durable, bench with a smooth steel working surface that can't splinter or get oil soaked. It belongs in your shop! Write for details.

Fig. 992

Two or more "Hallowell" benches easily can be converted into one smooth continuous working surface—or the long bench made into single units.

Pat'd and Pat's Pend'g.
Fig. 732
Drawer is extra

"Hallowell" steel construction provides 3 big advantages—splinter-proof working surface, lasting rigidity and easy movability—not found in wooden benches. And they cost less to buy than to build makeshifts. From the 1367 styles and models available right from stock you're sure to find those best suited to your needs.

Write for Catalog

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JENKINTOWN, PENNA.
Box 546

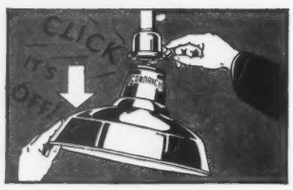
BRANCHES: CHICAGO, ST. LOUIS, SAN FRANCISCO

NOTHING EASIER

To Install or Service

LIGHTS WHEN IT'S LOCKED

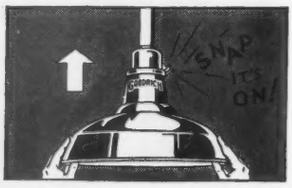
You simply wire and attach the hood to install this lighting fixture. Reflector and lamp is snapped on later. To remove for cleaning, release the snap lock; reflector and lamp comes off as a unit—instantly. To attach, press the reflector into the hood—it locks automatically and lights when it's locked.



Release snap lock to remove reflector and lamp

DISKONECT REFLECTORS

There's nothing to corrode or stick in the metal-to-glass connection between hood and reflector. Socket is instantly removable for thorough cleaning of reflector. The Diskonect is an exclusive Goodrich product.



When it snaps into place, it's locked

Sold only through electrical wholesalers

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temperatures, assured maintenance of motor capacity, and continuous cooling by means of the liquid being handled passing around the motor shell, it is claimed. Using a tubular type, ½ to 10-hp. motor, the pump has a rated capacity of 20-200 g.p.m., and is said to operate on temperatures up to 200 deg. F. and heads up to 250 feet. The motor shaft is carried on two ball bearings, and the impellers are mounted on the motor shaft. The units may be mounted in any position. Smith Meter Co., 5743 East Leneve St., Los Angeles.

Steam Valve

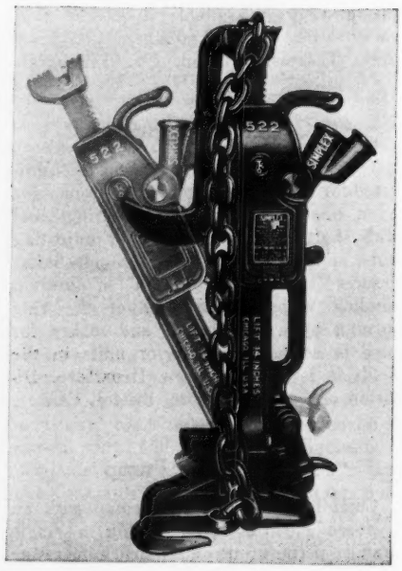
Valve, designed to eliminate the causes of leaky valves, features a spinning disk which is said to rotate at 2,000 r.p.m. at the moment before closing. This is said to stop scale or other foreign particles from sticking in the line of seating and to prevent "wire-drawing" by automatically sealing the line of closure. The valve is equipped with two seats—one for closing, one for cracking and throttling. When the valve is cracked or throttling, the disk does not spin. A reversing chamber directs steam flow to turbine vanes just before the disk descends into the seat. The turbine vanes are shielded from the steam flow when the valve is open. Sizes from ½ in. up. Ostlind Valve, Inc., 1305 S.W. 12th Ave., Portland, Ore.

Eyeshield-Respirator

Combination eyeshield and respirator has a clear plastic eyeshield weighing ½ oz. arched over the respirator and held in place by headband snaps. It is removable for cleaning. The Eyeshield-Respirator is available in several models. The eyeshields may be obtained separately for affixing to certain of the Pulmosan respirators now in use. Pulmosan Safety Equipment Corp., Johnson & Prince Sts., Brooklyn, N. Y.

Emergency Jack

No. 522 light-weight, single-acting, au-



Acme Steelstrap

Saved Us Money for Years . . .

NOW WE'RE EFFECTING STILL FURTHER ECONOMIES BY USING THE ACME SKID-LOAD PROCESS!"

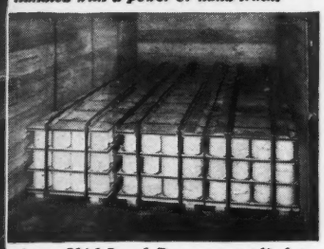
Handling costs are reduced—the danger of damage to shipments is minimized—time and space are saved—customer good-will is built up. These and many other advantages have been instrumental in effecting important shipping economies for shippers the country over.

Shown at the right are a few typical applications of the Acme Skid-Load Process, which enable more efficient, more economical shipment of products for all industries. By use of the Acme Skid-Load Process many individual units can be converted into a single, compact package. Frequently, bulky and otherwise hard-to-handle shapes can be assembled into one easily handled unit—often the handling of heavy objects is greatly facilitated. Loading and unloading are accomplished with a minimum of manual effort.

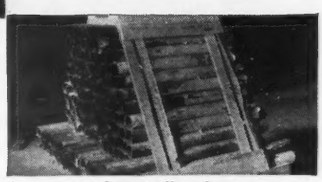
Chances are that you, too, can effect important economies by using this time and money-saving method in the shipping and handling of your products. Write for the descriptive folder, illustrating some of the numerous ways in which various industries have lowered costs by the utilization of the Acme Skid-Load Process. Or ask for data on your own shipments. Suggestions are free. Just mail the coupon.

Automobile stabilizers. Containers and damage both eliminated. Handling costs cut by shipper and consignee. The same Acme Skid-Load Process can be used for interplant movement.

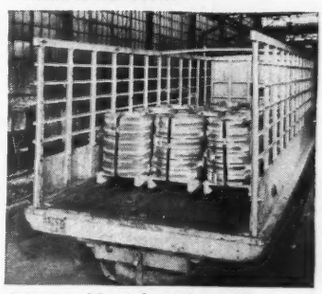
Another interesting application of the Acme Skid-Load Process is in the shipping of inner-sole leather. This skid is quickly handled with a power or hand truck.



Acme Skid-Load Process applied to spooled copper wire of well-known manufacturer. Investigate the Acme Skid-Load Process for economically and safely handling your own products.



Iron cores from rolls of rotogravure paper are returned on skids by printers to paper mills. The load pictured weighs 3600 lbs., but Acme Steelstrap makes it "Bound to Get There."



Motor truck load of coiled strip steel on non-returnable skids. Coils held on inexpensive wood skids or pallets with Acme Steelstrap tensioned and sealed. Injuries to workmen reduced by eliminating manual handling of each coil.

ACME STEEL COMPANY
2831 ARCHER AVE., CHICAGO, ILL.

ACME SKID-LOAD PROCESS
FOR MAKING SHIPMENTS
"BOUND TO GET THERE"

ACME STEEL COMPANY
2831 Archer Avenue, Chicago, Illinois
☐ Send me the booklet describing the Acme Skid-Load Process
☐ Have the nearest Acme engineer call

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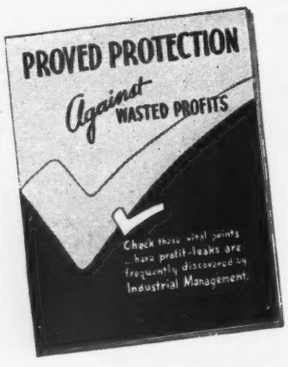
Wear, Weather, Waste STEAL PROFITS TOO

STOP THESE LOSSES WITH Carey INDUSTRIAL PRODUCTS

Day after day — year after year — wind and sun, rain and snow, heat and cold, are WEARING, WEATHERING and WASTING away a large share of the profits of industrial America — profits that in many cases might be saved by the application of more efficient and longer-lasting building and maintenance materials.

CAREY PRODUCTS of Asphalt, Asbestos and Magnesia have been serving industry for over 67 years. In the reduction of maintenance costs of roofs, sidewalls, floors and the protection against loss of heat in boilers, piping, tanks, etc., these Carey Products have made notable savings for many leading industries. To help you check profit leaks, we have prepared a book that will be mailed upon request.


PROVED PROTECTION
Against WASTED PROFITS
Check these vital joints ...here profit-leaks are frequently discovered by Industrial Management.

THIS BOOK TELLS HOW TO REDUCE PROFIT LEAKS

Guides you in making a complete check of your plant from roof to basement . . . tells where to look for waste in power production and in building maintenance . . . how to stop this waste. This book should be on the desk of every factory executive. It is yours for the asking. Write Dept. 31 for your copy today.

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To make these money-saving products readily available, a nationwide service and distribution organization is at your command. Its experienced personnel will assist you in solving your maintenance problems. A nearby representative will call at your request.

THE PHILIP CAREY COMPANY · Lockland, Cincinnati, Ohio
Dependable Products Since 1873
BRANCHES IN PRINCIPAL CITIES
ASPHALT, ASBESTOS AND MAGNESIA PRODUCTS FOR INDUSTRY

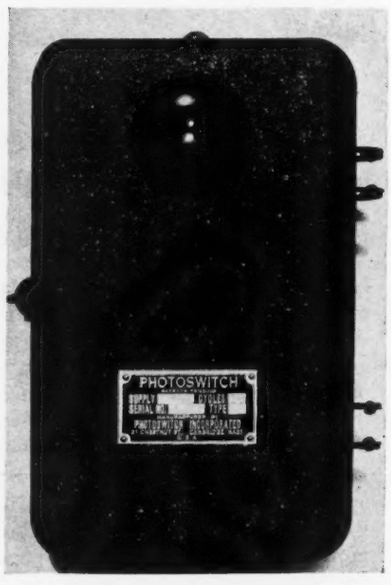
tomatic raising and lowering emergency jack has a capacity of 5 tons, and tilts on its base when the base pawl is disengaged to permit angular jacking or pushing and pulling. Chain, fitted with a grab hook as a sling, lifts the jack on the cap, the auxiliary shoe, the toe, or at intermediate points. Features an inner-ribbed base; a double-lever socket for operation in close quarters; machine corrugation on the toe lift; 36-in. heat-treated steel lever bar. Weighs 64 lb., has a 14-in. lift. Templeton, Kenly & Co., 1020 South Central Ave., Chicago.

Welding Helmet

Safe-Weld Helmet, for welding operations in confined spaces, protects the entire head. Air pouch over nose and mouth afford ventilation when the leather hood is closed. The leather may be folded back for added ventilation in surface or shop welding. Back light and flashes, and sparks and flying particles are excluded by the welding goggles held in place by a "live rubber headband." Made of spark- and flame-resisting material, it weighs 17 ounces. E. D. Bullard Co., 275 Eighth St., San Francisco.

Photoelectric Limit Switches

Type A14B limit switch, supplied with light source in weatherproof housings, is

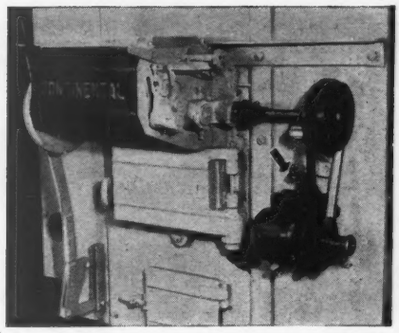


for application in heavy industries where vibration, humidity, and high temperatures are encountered. It is used to control and limit motion of such heavy objects as billets and sheet steel, cranes and hoists, red hot rods. Type A20C limit switch operates directly from the light given off by red hot metal. It provides limiting control; operates reversing rollers, conveyors; counts objects passing before it. Photoswitch, Inc., 21 Chestnut St., Cambridge, Mass.

Marking Hammers

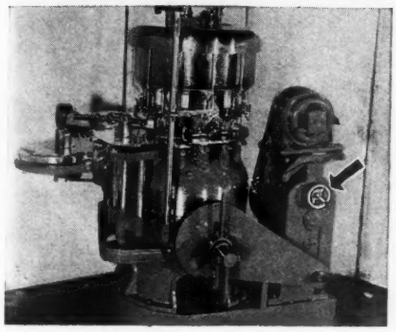
Style B inspector's hammer is furnished with one or more numbers, characters, or symbols engraved on one or both ends

What's New *In Speed Control Applications*



ON INDUSTRIAL STOKER

Rate of coal feed to this furnace is regulated, to maintain uniform steam pressure, by means of a REEVES Motor Pulley which varies stoker speed at will of the operator, and holds the speed without fluctuation until a new setting is desired.

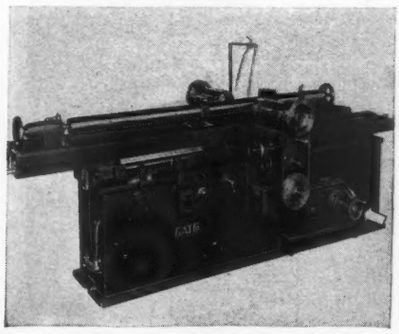


ON FILLING MACHINE

To provide adjustability of operating speed for different sizes of containers, and different viscosities of liquids, this specially built filling machine is equipped with a vertically mounted REEVES Variable Speed Transmission. Simply by turning the REEVES handwheel, the operator makes any change-over required, and without loss of production time. REEVES accuracy and positiveness insure the filling of each jar to the proper height, with no waste of product.

ON SPLINE MILL

For precision in operating speeds, and extreme flexibility to meet the requirements of widely varying sizes of keyways and shafts on which splines are cut, this Spline Mill is equipped with a REEVES Motodrive. The mill has a capacity of 96 inches between centers and handles diameters up to 5½ inches. Cutter diameters are $\frac{3}{16}$-inch to 1-inch, and spindle speed ranges from 230 to 600 r.p.m. The flexibility provided by REEVES has resulted in many sales in competition with other machines having gear set speed changing methods, says the manufacturer.



REEVES ADVANTAGES

Positive transmission of power at any speed and under varying loads; no slippage or fluctuation.

High efficiency . . . negligible loss of power transmitted.

Simplicity of design and operating principle . . . few moving and wearing parts; long life and trouble-free service.

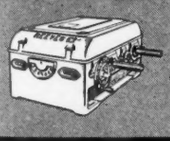
Wide range of designs, sizes, speed ratios, controls . . . insuring the correct application for your individual needs.

A nation-wide engineering organization at your service, without obligation.

May we tell you more about REEVES Speed Control and how easily it can be applied to the machines in your plant? Send for 122-page Catalog G-397, which describes and illustrates REEVES units and their use to speed up production and improve processes in over 18,000 plants.

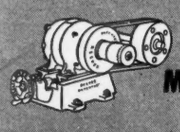
REEVES PULLEY COMPANY
Dept. F, **Columbus, Indiana**

Reeves *Speed Control*



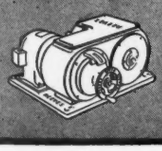
Variable Speed TRANSMISSION

Based on principle of V-belt driving between two pairs of adjustable cone-shaped discs. Provides infinite speed adjustability over wide range and for heavy duty service. Accurate and positive at all speeds. Modern open and enclosed designs, vertical, horizontal. Available in fourteen sizes—fractional to 75 h.p. capacities. Speed variations in ratios from 2:1 to 16:1 inclusive.



Vari-Speed MOTOR PULLEY

Simplified development of the Variable Speed Transmission. Mounts on standard shaft of any constant speed motor. Forms direct drive from motor to machine. Sliding motor base is moved forward or back by handwheel for speed changes. For light horse power requirements up to and including 15 h.p. and not greater than 3:1 ratio of speed range.



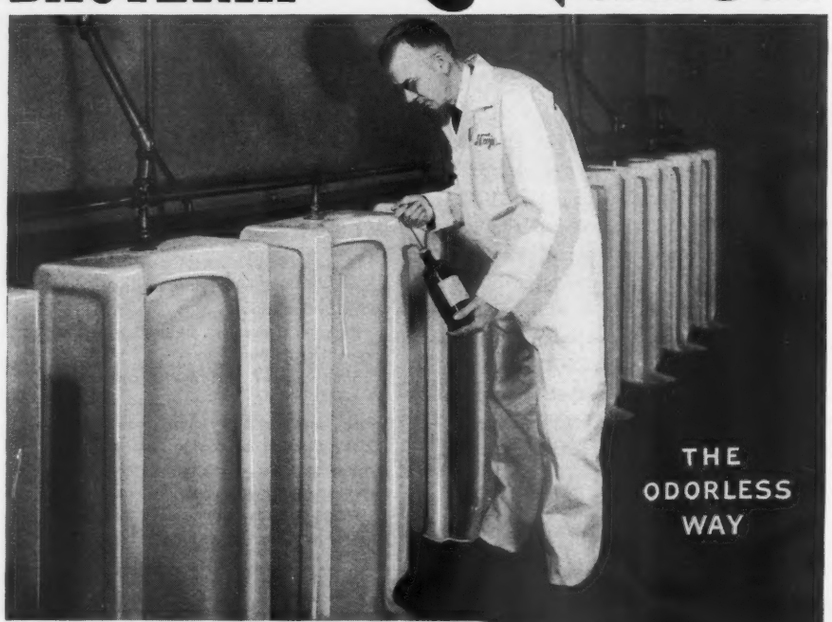
Vari-Speed MOTODRIVE

Combines in one compact, self-contained enclosure, constant speed motor, REEVES speed varying mechanism and reduction gears (where required). Any make standard foot-type constant speed (ball-bearing) motor may be used. Available in space-saving horizontal and vertical types—¼ to 10 h.p. capacities. Speed variations in ratios from 2:1 to 6:1 inclusive.

for the **HEALTH** *of your* **WORKERS**

for the **SAKE** *of your* **PROFITS**

DESTROY BACTERIA *with* **Nuzōn**



NUZON, the true pioneer in GENUINE ODORLESS SANITATION, helps industry fight a vicious enemy—lost time. Every industrial worker loses on the average, 9 days of work per year as a result of common illnesses. This absenteeism costs industry the staggering annual sum of $8,000,000,000. Your plant is right now bearing part of this cost. NUZON, used as recommended, will substantially reduce your cost of this waste.

Do not cover up malodorous, unsanitary working conditions by using perfumes or ineffective chemicals. Drive unsanitary conditions permanently from your plant by regularly using NUZON. For, in order to stop bacteria growth and organic odors, you must attack them at their source by direct contact. NUZON never fails if used as recommended. NUZON used today may save lives tomorrow.

Nuzōn is
a reliable disinfectant and genuine deodorant, alkaline in general character and action. Odorless, colorless, non-inflammable, non-gaseous. The pioneer in genuine odorless sanitation.

Nuzōn does
remove organic deposits by a gentle but certain neutralizing chemical process. Destroys all organic odors, yet leaves no trace of a chemical odor. Kills Streptococcus Pyrogenes, diluted 1 to 10 in 5 seconds. Kills Eberthella Typhosa, diluted 1 to 2400 in 5 minutes (F.D.A. Laboratory method).

Service

We maintain an Industrial Hygiene service department which supervises the use of Nuzon in your plant. This department makes periodic inspections and recommendations without charge. Address inquiries to

Nuzōn does not
contain acids. Injure porcelain, enamel, drain pipes, stainless steel, nickel or nickel-plating. Injure or stain white linens and cottons.

NUZŌN McDEVITT CORPORATION
79 N. THIRD STREET COLUMBUS, OHIO

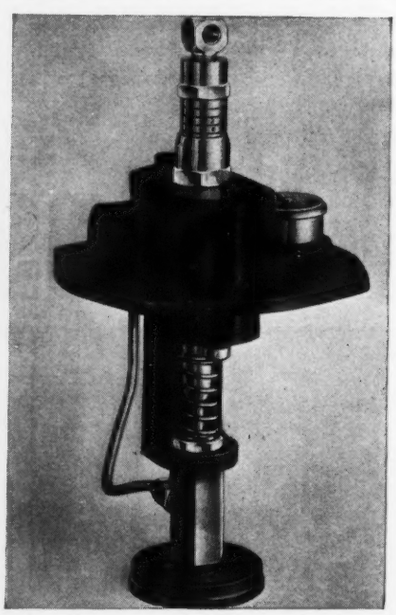
of the head. If one end only is engraved, the mark may be imprinted on the object inspected by hitting the plain end with a sledge or hammer. The plain end may also be used for inspection tapping. Style C is marked on one end only and is lighter in weight than Style B. Made of alloy tool steel and machine engraved, both hammers can be used on unhardened alloy steel parts, castings, stainless steel, aluminum. H. O. Bates, 251-57 North Broad St., Elizabeth, N. J.

Lift Jacks

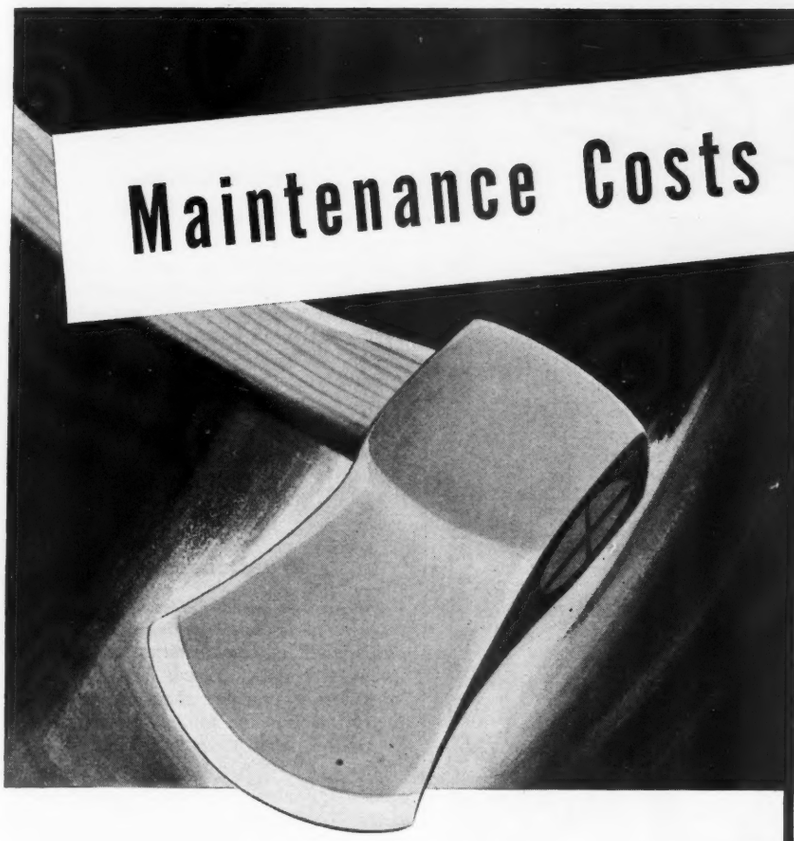
Projecting flange on a lift jack, designed to engage skid trucks without the help of a mechanical device, engages with a flange on the skid truck's coupling which in turn automatically engages the connecting pin when the operator lowers the jack handle. The flange design prevents the jack from becoming disengaged from the coupling should the handle be dropped while the truck is in transit. To uncouple the jack from the skid truck, the operator raises the handle and moves it to either side. For use with various sizes and styles of semi-mobile trucks, the jack can be furnished with plain or roller-bearing semi-steel wheels; with soft- or hard-tread vulcanized-on rubber wheels, plain or roller-bearing; oil-resisting, vulcanized-on wheels, plain or roller bearing. Bond Foundry & Machine Co., Manheim, Pa.

Hydraulic Lubricator Pumps

Type C and Type G hydraulic lubricator pumps feature a small tube (outside diameter $\frac{5}{32}$ in.) as the connection between the machine hydraulic system and the pump used for feeding oil to the bearings, thus permitting the pump to be located where convenient. Type C is arranged for mounting on a standard two-pint or six-pint oil reservoir. Type G is adapted to mounting in a reservoir cast integral with the machine. The inlet, protected by a felt filter disk, is submerged under oil in the reservoir. The hydraulic



Maintenance Costs SPLIT!



Basically different Principle means...

LESS WEAR
LESS MAINTENANCE
LONGER LIFE

The Westinghouse Hermetically-sealed Unit

...the HEART of every "TEMPERED COLD" WATER COOLER

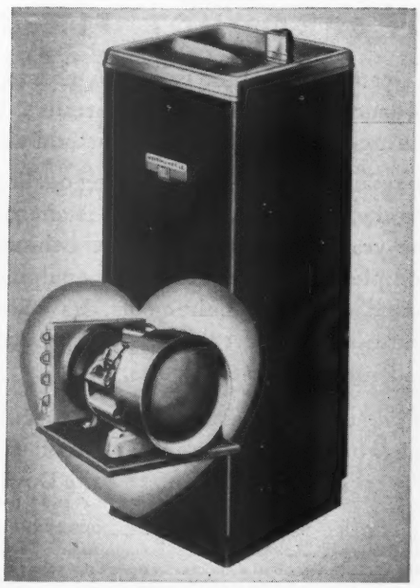
...reduces maintenance costs by eliminating (1) Belts (2) Pulleys (3) Gaskets (4) Shaft Seals (5) Commutator Brushes.

Fewer parts to wear. Even these parts operate in a permanent supply of oil. No oiling necessary. Built-in Watchman prevents costly motor burnouts. All this means EXTRA years of trouble-free performance.

. . . . . with the PERMANENT COST CONTROL PLAN

Here is a complete line of water coolers whose standout performance is backed by a proved plan for revising maintenance costs DOWNWARD. The plan has three parts:

1. Standard one-year free replacement warranty on unit and cabinet.
2. During the next four years, if the Hermetically-sealed Unit should fail, Westinghouse replaces it without charge—and pays all transportation and labor costs.
3. After 5 years, if and when the Hermetically-sealed Unit should fail, Westinghouse will replace it on an equitable exchange basis. The exchange unit carries four years' replacement protection with all the features of the second part of the plan.



Exclusive "PLUS VALUE" Features

Non-Clog Drain • Stainless Steel Top • Special Capacity Booster • High Efficiency Cooling Chamber • Built-in Watchman • Hermetically-sealed Unit.

Westinghouse "Tempered Cold" WATER COOLERS
"Build Friendly Relations"

Westinghouse Section 75, 653 Page Blvd., Springfield, Massachusetts

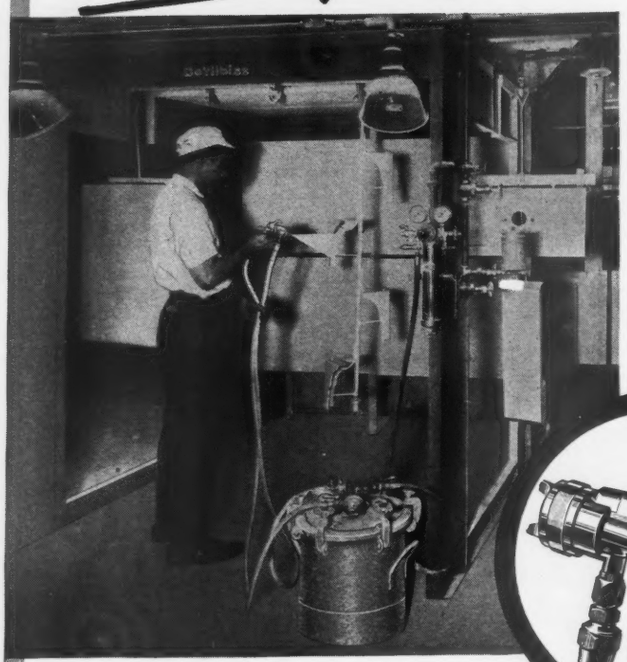
Please send complete details on Westinghouse "Tempered Cold" Water Coolers and the Permanent Cost Control Plan.

Name.....

Address.....

City..... State .....

Check your COSTS!



INCREASE YOUR PROFITS WITH THIS MODERN METHOD OF PRODUCT FINISHING

● Get the facts behind the cost figures that come out of your product finishing department. Right there the modern DeVilbiss spray method will help you.

In reducing costs and improving quality, DeVilbiss Product Finishing Equipment is ahead because of the years of spray experience behind it. It is a complete line that includes equipment exactly suited to your requirements. Its efficient design and operating features step up production speed and lower operating costs.

If mounting product-finishing costs are cutting into your profit, you can depend on DeVilbiss for a practical solution. Call or write DeVilbiss today.

THE COMPLETE DEVILBISS LINE CONSISTS OF: Spray-finishing equipment . . . Automatic coating machines . . . Tanks for spray materials . . . Spray booths and exhaust fans for vapor and dust elimination . . . Air regulators, cleaners and dusters . . . Air Compressors . . . Respirators . . . Specialized hose for paint, air, water, gasoline, welding and pneumatic tools . . . Hose connections . . . Water and oil guns . . . Equipment to prevent offset in printing . . . Paint stripers . . . Medicinal atomizers . . . Perfume atomizers.

DE VILBISS SPRAY SYSTEMS

THE DE VILBISS COMPANY • TOLEDO, OHIO • U.S.A.

pistons are usually $\frac{5}{16}$ in. in diameter; the oil pistons, $\frac{3}{16}$ or $\frac{1}{16}$ inch. Working stroke—maximum ½ in.—is adjustable by screw. Bijur Lubricating Corp., Long Island City, N. Y.

Portable Conveyor

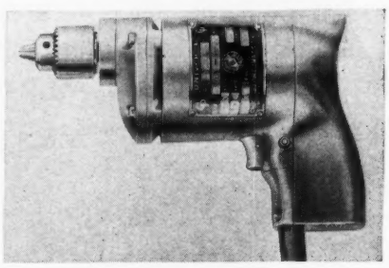
Portable "featherweight" freight conveyor, for handling bags, boxes, and cases weighing up to 125 lb., can be handled by one operator and is said to require only a 3-ft. aisle space. Equipment is available in belt width of 14 in.; in lengths of 14, 17, 20, and 23 ft. in a combination of horizontal mountings, and in a combination of elevating mountings for piling to heights of approximately 15 feet. Handling capacity is rated up to 1,500 units per hour. Portable Machinery Division, A. B. Farquhar Co., Ltd., York, Pa.

Wardrobe Racks

No. 3 steel wardrobe rack that can be used in offices or shops is made of seamless square tubular furniture steel and is completely open. A rack for rubbers and overshoes is provided along the bottom, a hatrack across the top. Available in any length by the foot, it accommodates three persons per running foot, and may be had with removable or attached wooden hangers. Matched lock box compartments, six high, are provided for interlocking assembly. Vogel-Peterson, 1803 North Wolcott Ave., Chicago.

Electric Drill

Electric drill, for metal or wood drilling up to ¼-in. capacity, has a motor available in three speeds; one pair of helical



gears; bearings and ball bearings mounted in steel inserts. The casting at the end of the handle is perforated with small holes to provide for air intake. The switch is a 2-pole inclosed type with trigger attached. The drill can also be furnished equipped as a screw driver for No. 8 or $\frac{3}{16}$-in. machine screws; as a nut runner for $\frac{3}{16}$-in. nuts or bolts. Chicago Pneumatic Tool Co., 6 East 44th St., New York.

Wheels

Cushion-tired pressed-steel disc wheels, for trucks, grease carts, dollies, feature a lug-type steel rim that eliminates tire slippage. Available in 3 sizes. Pneumatic and semi-pneumatic steel spoke wheels, for light-duty portable equipment, have a

(*Continued on page* 139)

(Continued from page 136)

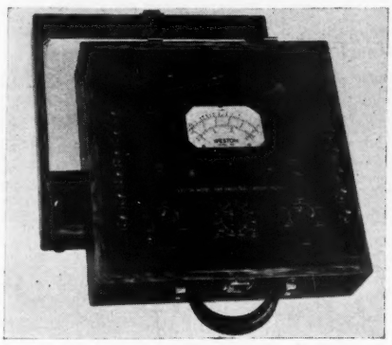
fabric base to prevent slipping and stretching. They feature oval-type spokes; semi-steel hubs, and rolled-steel rims. Available: 6 sizes—pneumatic; 5 sizes—semi-pneumatic. The Geneva Metal Wheel Co., Geneva, Ohio.

Low-Bake Finish

Polymerin-100 metal finish is said to be resistant to common deteriorants, chipping, and scratching. Film hardness, adhesion, toughness, and color retention are some of the characteristics claimed for it. It may be used in conventional ovens, and with force-dry equipment when the oven heats are stepped up slightly. Curing temperatures 100 deg. F. below those of the original Polymerin are said to be possible. Ault & Wiborg Corp., 75 Varick St., New York.

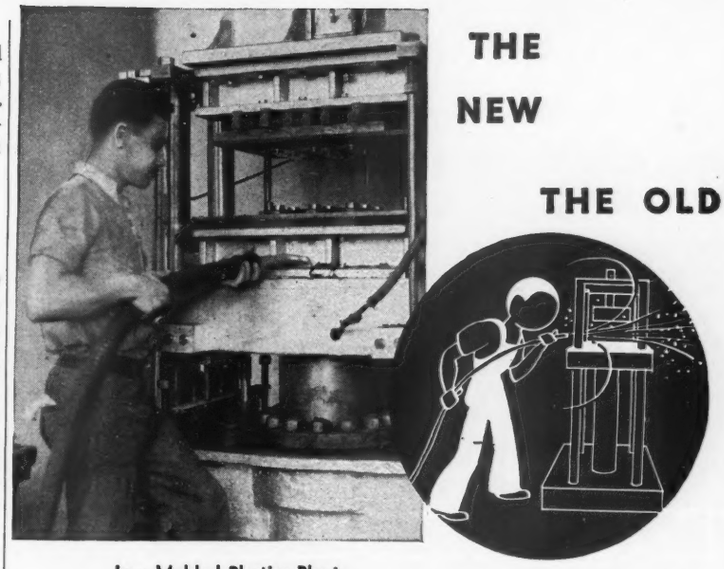
Circuit Tester

Model 785, used for individual measurements on control and signal equipment, and electronic apparatus, has 27 ranges for a.c. and d.c. voltage and current measurements and resistance measurements. Measurements on oscilloscope circuits are said to be possible because of the sensitivity of the instrument. A standard unicell is employed on ranges where appreciable current is drawn by the ohmmeter circuit. Two 7.5-volt batteries are used to supply energy for high resistance ranges only. Test leads are supplied with the circuit tester for voltage and resistance measurements and binding posts are supplied for current measurements, thus obviating possibility of using test leads for current measurements where too high a current might be put through the leads. Case measures 13 x 12½ x 5½ in. Weston Electrical Instrument Corp., Newark, N. J.



Ventilating Unit

Bifurcator, designed to remove corrosive, toxic, high-temperature, and hazardous fumes, is installed as part of the duct system without directional change in airflow. Consists of an axial-flow pressure fan mounted in a housing with the motor set in a separate built-in through-ventilated chamber isolated from the airflow. Available in 8- to 48-in. sizes, in a range of metals and alloys covered with acid resisting paints or enamels or with lead



In a Molded Plastics Plant

You can't kick dust around

AND EXPECT TO MAKE TOP PROFITS

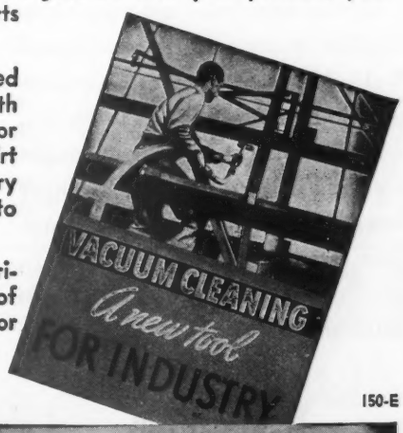
Whether you blow it, shove it with a broom, or just plain kick it around under foot, dirt and dust will get back at you in the profit and loss column sooner or later. The strange thing about it is that a powerful vacuum cleaning system will immediately and forever remove it to containers in the basement at less cost than any combination of hand methods.

In fact, there are many spots in the plant where hand cleaning is either impossible or too expensive to even consider.

For instance, have you ever seen men try to remove cotton, solder, silica sand or soapstone dust by hand? Can you picture a worker trying to retrieve gold, babbitt, rubber or any other valuable material from the litter on the floor? These are only a few of the added dividends that the Spencer Vacuum System provides. And withal it cleans large areas quickly, more thoroughly and at less cost. It places plant house cleaning on a continuous production basis, on a fixed schedule with a known result, a known time, and a known cost. Floors, ceilings, walls and overhead pipes constitute a constant source of fine dust which is dislodged by vibration and breezes, and which goes all over your product, your men, and even into the most delicate parts of your machinery.

The ultimate is a stationary system piped throughout the plant, but you can begin with a heavy duty portable as small as ¾ H.P. or as big as 7½ H.P., with a 7½ cubic foot dirt capacity. These with the Spencer Stationary Systems up to 100 H.P. provide a selection to fit your problem and your pocketbook.

Spencer Bulletin No. 120F gives the experiences of others and a complete description of the equipment and tools. Why not write for it now?



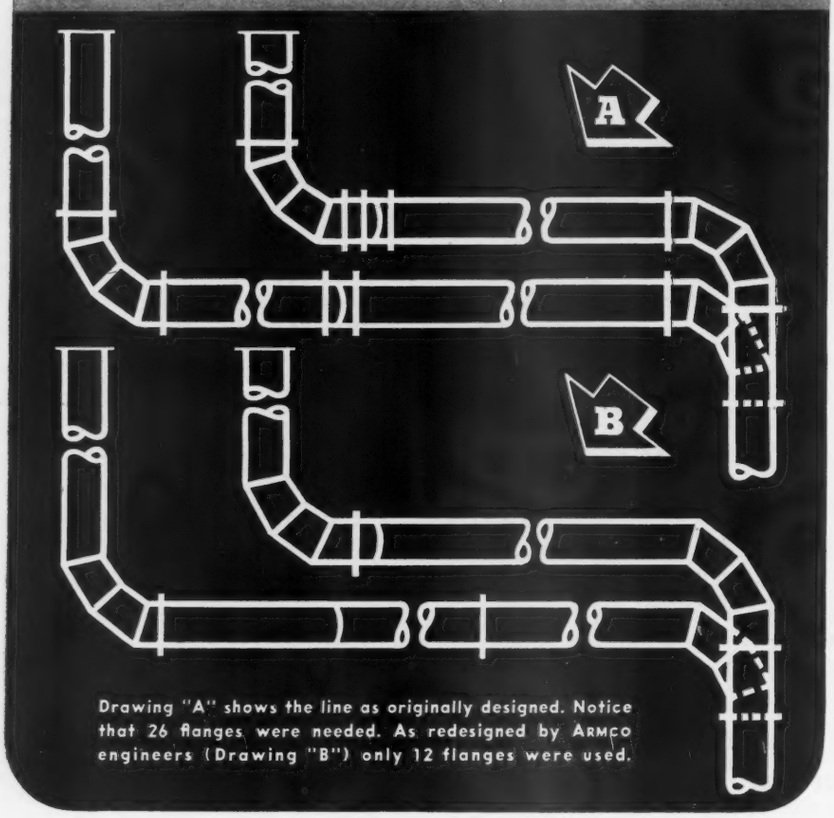
150-E

SPENCER HARTFORD

CENTRAL AND PORTABLE VACUUM CLEANING SYSTEMS

THE SPENCER TURBINE COMPANY, HARTFORD, CONN.

INQUIRY SAVES 24% ON ONE PIPING JOB



Drawing "A" shows the line as originally designed. Notice that 26 flanges were needed. As redesigned by ARMCO engineers (Drawing "B") only 12 flanges were used.

• Here is the true story of a purchasing agent who asked to be shown... and saved time and money for his company as a result.

He had heard about the possibilities for saving with ARMCO Spiral Welded Pipe. So when new pipe was needed he sent the plans to ARMCO.

A few changes in design brought a saving of 24%! By using longer lengths of ARMCO Pipe, shop-fabricated fittings and fewer joints, the cost was cut from $345.96 to $262.66. And savings didn't stop with this reduction in purchase price. ARMCO Pipe was easy to handle and fewer joints meant less assembly work. Maintenance is sure to be less because there are fewer potential sources of costly joint leakage.

There is an even greater opportunity for economy on larger jobs. Why not learn how much *you* can save by using ARMCO Spiral Welded Pipe? Just send us your plans and specifications. The American Rolling Mill Co., Pipe Sales Division, 351 Curtis Street, Middletown, Ohio.

ARMCO

Armco

SPIRAL WELDED PIPE

or rubber protective coatings. DeBothezat Ventilating Equipment, Division of American Machine and Metals, Inc., East Moline, Ill.

Groover and Grinder

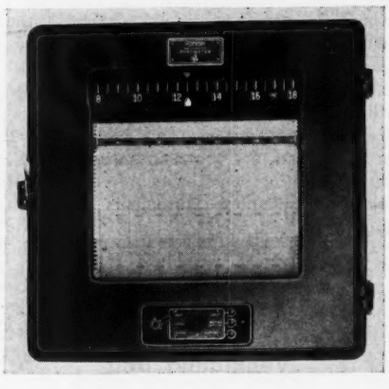
Double-wheel heavy-duty groover and grinder, mounted on steel rollers for floor work, is designed for using a single-disk wheel for grinding, a single abrasive cutting wheel for making single cuts or grooves, a pair of cutting wheels for cutting channels. The wheels can be adjusted to cuts up to depths of 2 inches. The grinder can also be equipped with a wide-face grinding wheel for surface grinding soldered seams on large flat metal surfaces. The guard permits the mounting of a scratch brush for removing paints. Ball-bearing universal motor, 110 and 220 volts. Wodack Electric Tool Corp., 4627 West Huron St., Chicago.

Cutter

For cutting wood, plywood, celotex, masonite and other building materials up to 1¼ in. thick, the portable Guildcutter is equipped with a saw blade 4½ in. in diameter and a saw arbor that provides for the use of a Dado head ¼ in. wide for ploughing, grooving, tenoning and dadoing. A telescope-type guard protects the blade. The base tilts to 45 degrees for beveling. Universal motor operates on 110 volts, a.c. or d.c. The cutter is 11¼ in. long and weighs 7 pounds. Syracuse Guild Tool Co., 1720 North Salina St., Syracuse, N. Y.

Potentiometer Recording Controllers

Series of Potentiometer Recording Controllers features an improved detecting mechanism, a new integral recording and control mechanism, and a new control



system it is claimed. A calibrated detecting cam, that is said to sense deflections of the galvanometer pointer of less than 0.0001 in. without lost motion, is used. The slide-wire contact, recording pen, and cam follower actuating the control cam, are assembled as a unit on the same carriage. Accuracy of the recording and control mechanism is said to be ¼ of 1 per cent of scale range. The control system is affixed directly to the shaft of

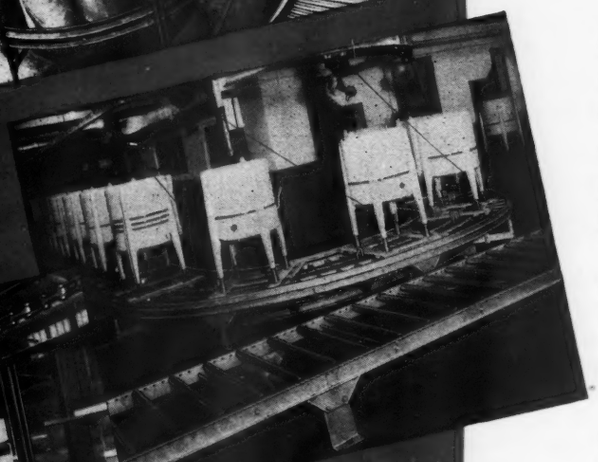
Overhead Chain Conveyors speed seed-order filling by providing constant supply of merchandise.

Note the flexibility of Lamson Conveyors. This 3-way switch directs flow of goods to the shipping dock, first floor storage and second floor storage.

Cut Handling Costs

the way these Lamson Users have!

Lamson Conveyors for Heavy Duty Service solve problems in Steel Mills, Brass Mills and other metal working plants.



Lamson Conveyors provide a straight-line forward movement, eliminating "traffic jams," and bringing about important production economies.

Important production economies—$97.44 per day—in this pottery were brought about by Lamson Conveyors. These conveyors make workmen's tasks easier and reduce the toll of product breakage.

THE highly specialized experience and training of Lamson engineers have helped thousands of companies in nearly every type of industry to cut their handling costs. Practically every type of conveyor you might need, in either standardized units or custom-built to fit your specific needs, can be furnished by Lamson. The broad knowledge, accumulated through more than 50 years by Lamson engineers, is yours *without obligation*. Fill out the coupon and send it to us TODAY!

Lamson makes a Complete Line of Conveying Equipment, including:

Gravity Conveyors	*Vertical Conveyors*
Belt Conveyors	*Slat Conveyors*
Overhead Chain Conveyors	*Push Bar Boosters*
Live Roll Conveyors	*Spiral Chutes*

LAMSON

Conveyors

Just Check and Mail this Coupon

SEND FOR THIS NEW *Free Book* . . .

The LAMSON COMPANY, Inc., Syracuse, N. Y.

☐ Send me free copy of "LAMSON CONVEYORS for EVERY INDUSTRY."
☐ Have your nearest Lamson Engineer call.

Name..... *Title*.....
Company.....
Address.....
City..... *State*.....

FOR MODERN EFFICIENCY AND SAVINGS IN

PLANT HOUSEKEEPING

PUT THIS INDUSTRIAL CLEANER ON THE JOB

● This Invincible Suction Cleaner is designed primarily to do a far better job of plant housekeeping than is possible with old-fashioned methods, and at much lower costs! It does just that, and more, as evidenced by its effective use in thousands of plants. It saves time and labor . . . prevents costly damage . . . and greatly improves working conditions.

Consider—

1 that it is not a huge, awkward machine. It is surprisingly light, compact, and easy to use. It even follows the operator by a slight pull on the hose, and this saves lots of time.

2 that despite its unusual portability it is ruggedly built and is designed to "take it"—will actually withstand years of constant, 24-hour-a-day operation if need be.

3 that it has abundant cleaning power for even "tough" cleaning jobs. Any surface from floor to roof is safely and thoroughly freed from dust and dirt. No dust whatever is scattered.

The "Invincible" cleans floors, walls, pipes, beams, shelves, bins, conveyors, and every nook and corner.

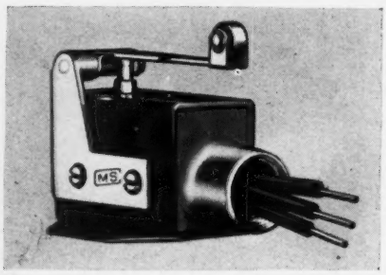
● This "Invincible" is already bringing savings and advantages to a majority of the Country's leading manufacturers. Can it do as much for you, too? Drop us a note and get complete information.

INVINCIBLE VACUUM CLEANER MFG. CO.
... 440 DAVIS-DOVER, OHIO

the cylindrical control cam. Anti-vibration rubber-cushioned mountings are used within the case. Open-and-shut action or throttling action, with or without automatic reset, is available in the air-operated models. The Foxboro Co., Foxboro, Mass.

Actuator

Type J roller-lever actuator can be used with regular and metal-clad switches. Two mounting holes on the actuator that



match with mounting holes on the Micro switch facilitate mounting. A case-hardened roller with an oilless bronze bearing is mounted on the end of the lever arm which rides on an oilless bronze bearing resting on the switch plunger. Operating ratio is about 8:1. Minor adjustments can be made by bending the lever arm slightly. Micro Switch Corp., Freeport, Ill.

Cooling Surface

Series W Surface that makes use of copper tubes and plate-type aluminum fins is for air cooling and cooling and dehumidifying with cold water, and for air heating with hot water. Three water-circulating arrangements permit selection for internal water velocity. Counterflow principle of water circulating is used. Sections are incased, free-floating, in galvanized casings, and are available in dimensions ranging from 1 to 8 rows of tubes deep; in fin widths from 8.4 to 36 in.; in 16 finned lengths of 12-120 in.; and in three varieties of fin spacing. John J. Nesbitt, Inc., Holmesburg, Pa.

Disinfectant and Deodorant

Odorless deodorant and disinfectant, Nuzon, is colorless, non-inflammable, non-gaseous. Alkaline in general character and action, it eliminates organic odors, leaves no chemical odors, acts as a water softener, dissolves organic and uric acid deposits. It is said to be non-injurious to porcelain, enamel, drain pipes, stainless steel, nickel or nickel-plating, rubber, white linens or cottons, and is applied by a stainless-steel sprayer. Nuzon-McDevitt Corp., Columbus, Ohio.

Ground-Wire Bracket

Main body casting of the Swing-Link ground-wire bracket has a groove on the outer side which holds a link at a distance of 3 in. from the pole. The link supports a suspension clamp for holding the

Reclaim up to 98.6%
OF OIL ON YOUR CHIPS

TOLHURST CHIP WRINGERS

PAY OVER 100% RETURN ON INVESTMENT

These machines give you the highest percentage of cutting oil recovery obtainable with any type of equipment. Tolhurst Chip Wringers accomplish their record-breaking recoveries by employing only centrifugal force! No steam is used thereby eliminating any loss of oil through emulsification. Operation is simple and safe — unskilled operators can run them efficiently.

TOOL WEAR REDUCED

Tool room records of Tolhurst users show that tool wear is often reduced as much as 50%! This additional savings results from having a plentiful supply of clean, reclaimed cutting oil that can be used more generously on machine tool operations.

WRITE TODAY for interesting FREE literature that contains complete information on Tolhurst Chip Wringers and the welcome savings they bring to users.

Removable "basket" is loaded with oily chips and conveyed to the wringer by hoist. After wringing operation, the "basket" is lifted out and chips dumped. Recovered oil flows from outlet to tanks or containers. Tolhurst Chip Wringers are made in 2 types and 4 sizes.

TOLHURST CENTRIFUGAL DIVISION

101 Tolhurst St.

American Machine and Metals, Inc., East Moline, Illinois

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TOLHURST CENTRIFUGAL DIVISION ESTABLISHED 1852

INVESTIGATE THE COST REDUCING ADVANTAGES OF THESE OTHER TOLHURST MACHINES

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Provides a faster, evener, more economical method for applying enamels, lacquers and other finishes to small metal parts. 1.25 up to 15.7 cu. ft. capacities.

CENTRIFUGAL GALVANIZER

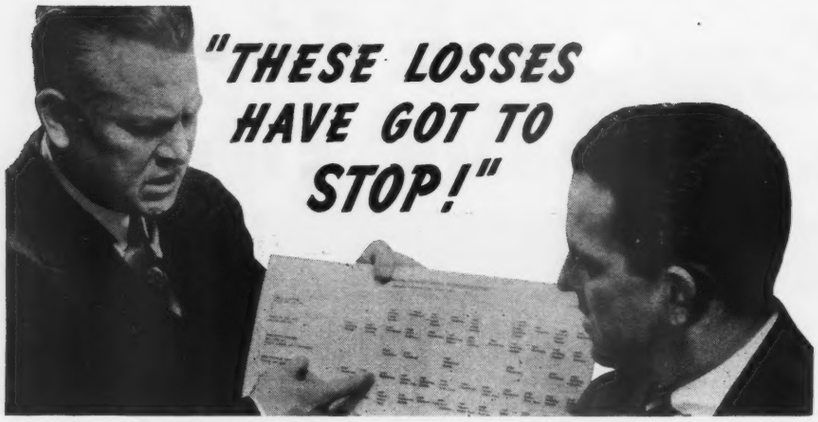
Cleaner, smoother, higher lustre galvanizing of any desired thickness given to stampings, threaded pieces, nails, hardware, etc. in few seconds. Amazingly low operating costs.

METAL DRYER

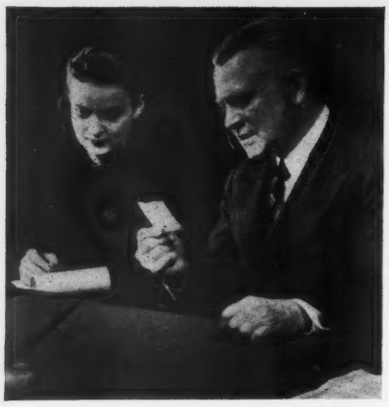
Cuts production costs by drying small metal parts in 2 to 3 minutes per load — without use of sawdust. Made in 2 types. Sizes .14 to 1.3 cu. ft.

IMPREGNATOR

For quickly processing radio condensors and other wood, fibre, paper and metal articles requiring impregnation with a fluid. Made in 2 types. Sizes .14 to 10.0 cu. ft.



"I'M tired of these endless inventory losses. It's plain enough that there's a lot of expensive thievery going on around this plant. Trouble is, we actually invite trespassers. What's to prevent any one from coming into our place whether he has any business here or not? That's the thing we need to correct."



"That's right, Mr. Wilson. Look at the fence around that plant next door. That's what we need. They never have the trouble we do. Nobody's going to get over that barbed wire top and get away with anything. The Cyclone Fence people built it for them years ago and it looks as strong as ever. Why not ask Cyclone to figure on our needs. Their ads say that it won't cost anything to get an estimate."

"Mail this coupon for me, Miss Roberts. We'll see what Cyclone has to offer. They sell more fence than anybody else, so they ought to have just what we want."

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Please mail me, without obligation, copy of "Your Fence—How to Choose It—How to Use It." I am interested in fencing: ☐ Industrial Property; ☐ Playground; ☐ Residence; ☐ Estate; ☐ School. Approximately.....feet.

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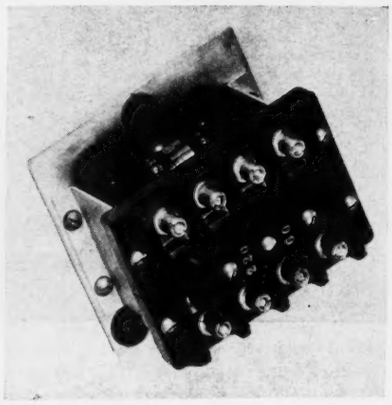
UNITED STATES STEEL

ground wire. The design permits the link to swing on the bracket thus protecting the wire from wind damage by allowing it to swing through a wide lateral arc. The bracket is attached to the pole by a through-bolt and may be used for angle positions. The swing link can be furnished without a suspension clamp, with a 0.46-in. clamp or with a 0.60-in. clamp. Ohio Brass Co., Mansfield, Ohio.

Automatic Contactor

Series B automatic contactor is available in various types of inclosures for remote installations, minus the inclosure for



mounting on panels. Inlaid silver contacts are used. Movable parts travel on an involute gear-tooth bearing which allows the parts to travel on the same plane. The power unit is mounted on a base plate with rubber grommets and the assembly is fastened to the inclosure by 3 screws projecting through rubber grommets, thus insulating the contactor from metal parts in the inclosure. Rating: 3 hp. at 110 volts; 5 hp. at 220 volts a.c.; 7½ hp. at 440-550 volts. Can be furnished with as many as 4 poles—normally opened or normally closed, or in any combination. Bender Warrick Corp., Birmingham, Mich.

Paint

No. 495 Korolac, a paint for application to metal surfaces, can withstand acids, alkalis, and salts in common concentrations up to temperatures of 150 deg. F., it is claimed. Also, it is said to be unaffected by chrome, nickel, cadmium, zinc, copper, brass, silver, or tin-plating solutions. Though resistant to atmospheric changes, and abrasion, it is sufficiently elastic to conform to contraction and expansion of the covered metal. A Korolac primer is available for use with the paint. Both can be applied by brushing or spraying. The B. F. Goodrich Co., Akron.

Fluorescent Lighting

The Super-Lite, using two 40-watt fluorescent lamps, is for general illumination, and can be mounted 9-12 ft. above the floor. It operates on 60-cycle 110-125 and 220-250 volts. Of open-end construction, it utilizes the Tulamp ballast, starting compensator, and removable starting switch, and is said to minimize stroboscopic effect. Swivel suspension, pinned

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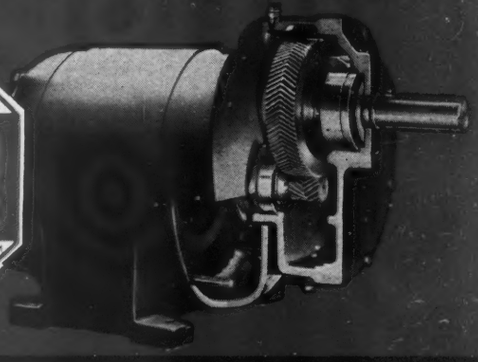

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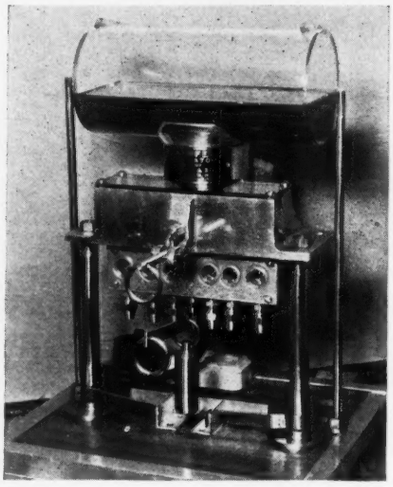
WRITE FOR ILLUSTRATED FOLDER

to one support and swiveled to meet junction box for second support, facilitates installation. Junction box connects directly to conduit. Can be suspended fro wire or chain supports in place of conduit. The Miller Co., Meriden, Conn.

Lubricator

Mykrofeed lubricator provides closely controlled flow by gravity from an airtight, transparent reservoir made of Lucite. A self-closing ball valve, operated either by a solenoid or manually through a lever, controls reservoir outlet. For automatic operation the solenoid is con-



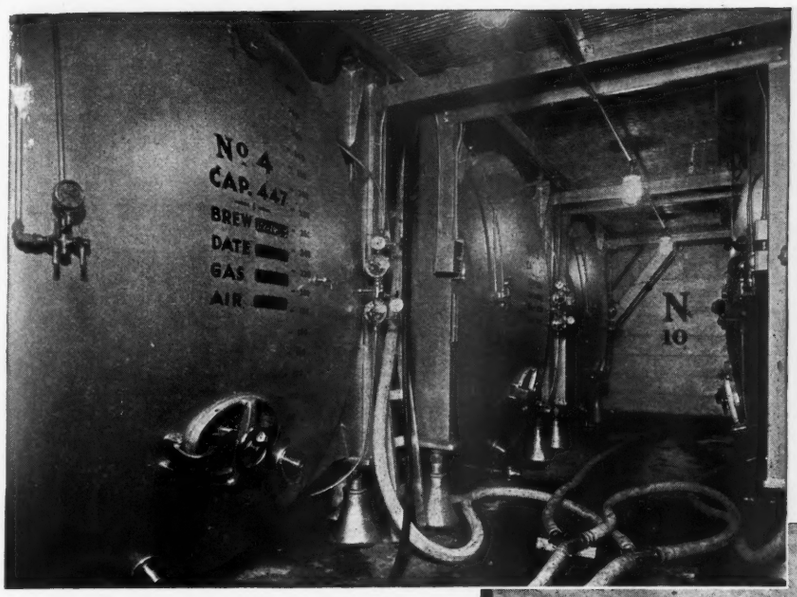
nected across the motor circuit. With machines driven by belt or otherwise, the solenoid may be connected to the lighting circuit. Unit is available with any desired number of sight feeds up to twenty. By means of multiple-distribution feeds, one feed from the main unit can be made to serve from 1-4 bearings. Adjustment of feed over practically any desired range can be made. It is claimed that all red and pale oils, including Texas pale oils having viscosity up to 2,000 sec. Saybolt, can be handled. Except for the valve control lever and pins the Mykrofeed lubricator is made throughout of non-corrosive materials. Bromley & Son, 232 Chestnut St., Kearny, N. J.

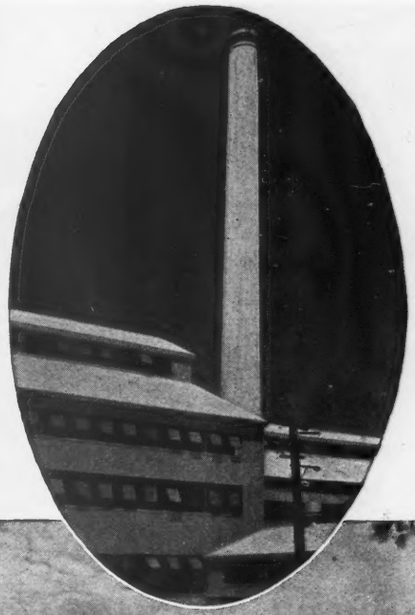
Radial Saw

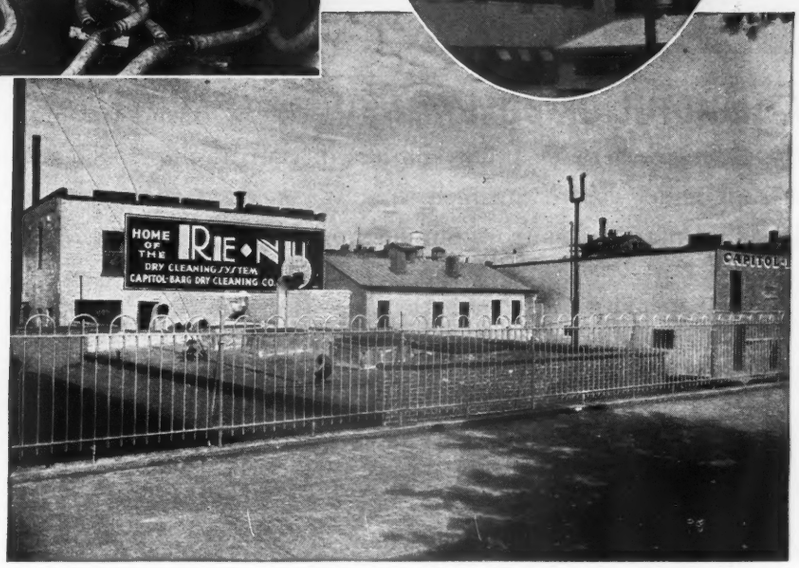
Uses abrasive disks or steel saws for cutting wood and metal, pipe and tubing. The saw is mounted pivotally on a horizontal ram to make it possible to set the blade at any angle desired. The blade is mounted directly on the shaft of the geared motor. The gears are protected by a shock-absorbing device which permits sudden stalling of the saw without damaging gears or motor, it is claimed. A magnetic circuit breaker gives added protection. Available with motors of 1, 1½, 2, and 3 horsepower. Walker-Turner Co., Plainfield, N. J.

Air Heater

Direct Gas-Fired Air Heater, featuring "controlled combustion," eliminates the smell due to unburned gases or poor com-







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A COMPLETE LINE • A TYPE FOR EVERY PURPOSE

A HANDFUL OF DUST What does it mean to you? It *can* mean the difference between profit and loss in your business. Unless dust is kept under control by modern dust collection equipment, your business may suffer from one or more of these serious losses—

RECLAMATION LOSSES—*due to waste of valuable dusts, as in ore refineries, cement kilns, foundry shakedown rooms, etc.*

CONTAMINATION LOSSES—*through dust pollution of your product or process.*

BREAKDOWN LOSSES—*through expensive repairs and delays caused by machinery breakdowns due to dust.*

WORKING EFFICIENCY LOSSES—*through spoilage and slack production that result from grimy walls and poor lighting.*

GOOD WILL LOSSES—*due to community annoyance over excessive flue dust dispersal from your stacks.*

Buell Dust Collectors, employing the patented, highly efficient Van Tongeren system, can minimize these losses for you. They are already profitably at work for hundreds of businesses. You will find them outstanding for low first cost and negligible maintenance. Buell engineers will be glad to survey your dust collection problems without obligation.

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Only Buell Cyclones have a Dust Pocket

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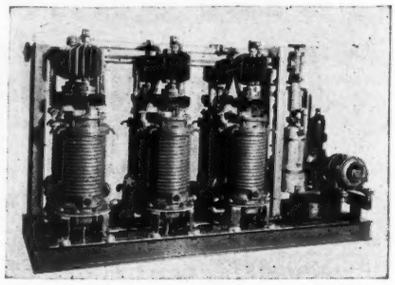
bustion, it is claimed. Also features a back-pressure baffle, controlled by an adjusting dial, to maintain combustion temperature, induced draft, and combustion efficiency under each operating requirement. Consisting of heater, fan, and motor, the unit may be mounted on the top, at side or rear, or underneath the oven or furnace. Made in sizes from 75,000 to 1,000,000 B.t.u. per hr., it may be applied to new ovens, dryers, and furnaces having a maximum operating temperature of 1,250 deg. F., or to old equipment. Despatch Oven Co., Minneapolis.

Hard-Facing Rod

No. 93 alloy welding rod, for hard surfacing wearing parts, is recommended for use where severe abrasion and moderate impact are encountered—cement clinker crusher rolls, slag crusher roll teeth, tube bending mandrels, cinder crusher rolls. Of ferrous composition, it contains chromium, molybdenum, cobalt, and other alloys. Said to have a tensile strength of approximately 43,000 lb. per sq. in. and a hardness, as deposited by oxy-acetylene welding, of 62 Rockwell C. When deposits are heat-treated by heating to 1,950 deg. F., and then air cooled, the hardness is said to reach 66-67 Rockwell C. May be applied by the oxy-acetylene process; by the metallic arc process using reversed polarity and flux-coated rods. Haynes Stellite Co., Kokomo, Ind.



Rectifier

Single-anode power rectifier consists of groups of small vacuum tanks each containing a single anode and its individual cathode. The tanks, externally cooled by water, are generally mounted in groups of six on a steel frame which also supports the vacuum pumping equipment connected to the tanks through a vacuum pipe manifold. Arc ignition and control equipment is also mounted and wired on the frame. Suited to applications where headroom is limited. Allis-Chalmers Mfg. Co., Milwaukee.

Stop Nuts

Nine stop nuts, embodying a self-locking element and a resilient non-metallic collar built into the head of the nut, are designated as thin hexagonal, spline, internal wrenching, countersunk and counterbored one-lug anchor, countersunk and counterbored two-lug anchor, countersunk corner anchor, bracket anchor, floating right-angle anchor, and floating basket anchor. The collar, in resisting the entrance of the bolt or screw, forces the

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you should use the original

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Because Rockbestos insulation won't dry out, become brittle, flake or crack to open paths for current leakage and moisture.

2 FIREPROOF

Because Rockbestos A.V.C. Wire has laminated insulation of felted asbestos, varnished cambric and asbestos braid that won't burn or support flame even under an arc.

3 PERMANENT

Because the asbestos in Rockbestos insulation won't deteriorate under heat or with age and is always "as good as new."

4 REDUCES MAINTENANCE EXPENSE

Because Rockbestos heatproof and fireproof qualities give you long-term service and make periodic replacement unnecessary.

5 RESISTS HEAT AND VIBRATION

Because heat can't dry out or crack the Rockbestos insulation, vibration doesn't get a chance to open it up and shake it loose.

6 SAVES WORK

Because Rockbestos stops the merry-go-round of failures and replacements in hot-spots where ordinary wire has a short life.

7 OIL, GREASE AND MOISTURE RESISTANT

Because Rockbestos A.V.C. won't rot or swell due to oil, grease or corrosive fumes and has ample moisture resistance.

8 HIGH OVERLOAD CAPACITY

Because copper heating won't break down or deteriorate the insulation, Rockbestos gives you greater carrying capacity.

9 PERMANENTLY FLEXIBLE

Because asbestos never loses its original characteristics, Rockbestos A.V.C. Wire and Cable doesn't get hard, stiff or crystallize.

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For your requirements the Rockbestos line contains the most complete assortment of heat resisting wires, cables and cords available, in either of the widely used Rockbestos A.V.C. or All-Asbestos constructions. More than fifty standard wires to draw upon, and a research department which is always ready to design a "special" if you need one. For our No. 10-E Catalog write to Rockbestos Products Corporation, 947 Nicoll St., New Haven, Conn., "Headquarters for Heat-Resisting Wires," or get in touch with our nearest branch office.

Also refer to Electrical Contracting and Electrical World Buyer's Reference Editions.

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Heating men will find their construction, and consequently their performance, the result of 44 years of continuous heat transfer experience.

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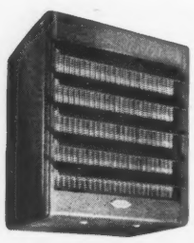
Fedders Type K Heating Coils are built in a complete range of sizes, capacities and dimensions to fit your installation requirements . . . reserve your personal copy of Catalog 601-H right now.



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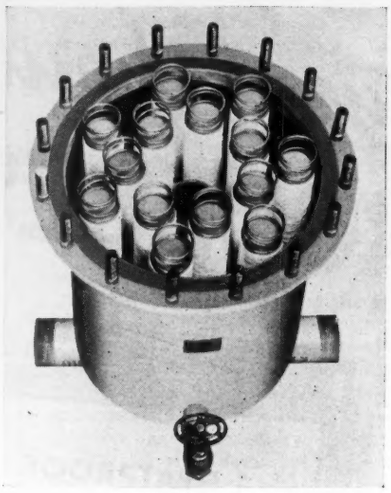
thread faces into a pressure-contact which is maintained after the nut is tightened, thus eliminating thread play and preventing the nut from working loose under vibration, operating stresses, or wear of surrounding parts, it is claimed. Elastic Stop Nut Corp., 1015 Newark Ave., Elizabeth, N. J.



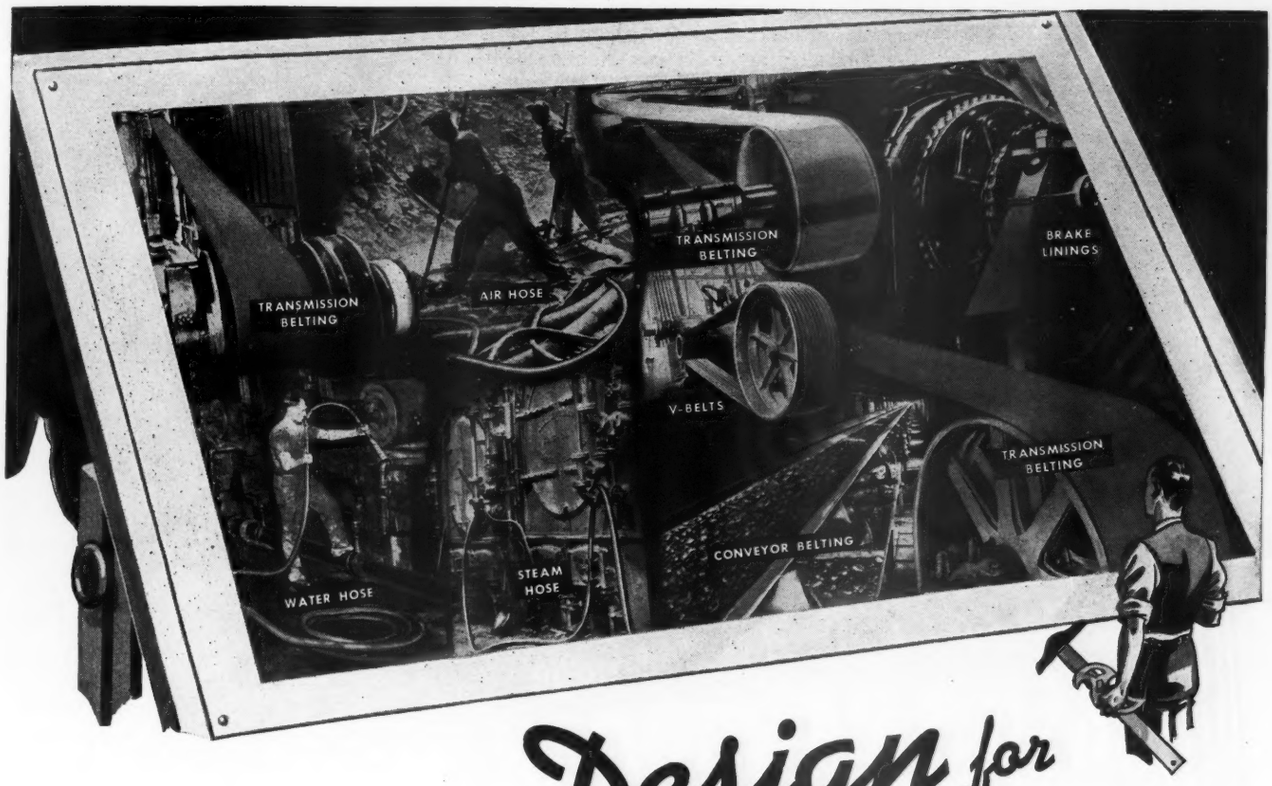
Filter

Fulflo filter consists of a shell, base plate, and cover, with 28 replaceable filter tubes made of cotton yarn wound on screen cores. The yarn forms a series of filtering sheets for removing coarse and finely divided impurities. Seat plates form a seal to prevent by-passing. Used in filtering water, solvents, paraffin, beverages, photographic solutions, cleaning compounds, fuel oils, chemicals. Furnished on special order for handling corrosive liquids. Commercial Filters Corp., 47 Macallen St., Boston.

Electrical Distribution System

Duct-inclosed busbar system, No. 125, provides plug-in openings every 12 in. to provide taps for power circuits, and is for use where the total connected load is small. Consists of standard 10-ft. sections of bus duct, each section having provision for 10 power taps or circuits (5 on each side), and such associated fittings as circuit protective plugs, and enclosers, and cable tap boxes. The sections may be used separately or in combination. Available: 30- and 60-amp., 250- and 575-volt, 2- and 3-pole models. BullDog Products Co., 7610 Jos. Campau Ave., Detroit.

The Square D Company, Detroit, has announced purchase of the Kollsman Instrument Company. Square D will continue to specialize in motor control and switch equipment in the electrical field, incorporating in its equipment some of the precsion ideas developed by the Kollsman organization for its line of special aviation instruments. The Kollsman organization will remain intact and its manufacturing will continue at Elmhurst, N. Y. Paul Kollsman is to devote his time in the future to research and invention, and will remain as consultant for Square D.



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Thermoid

Standard types of hose made by Thermoid:
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Water Hose
Steam Hose
Tank Truck Hose
Gasoline Hose
Suction Hose

BELTING · HOSE · PACKINGS · BRAKE LININGS

New Handling, New Savings

(*Continued from page* 49)

starts at one of the large presses, is blanked and formed; other equipment such as horning or brake presses are placed in such positions that each piece of work is handled progressively from one machine to another. At the end of the press line the auxiliary parts, such as hinges and drawer runs, are brought up. Spot and gas or arc welders are placed in position there so that these auxiliary parts can be welded on. At the end of the line a subassembly is made which is ready to go into storage or to the main assembly line.

Units are assembled progressively along the main assembly line. Grinding, adjusting, and other necessary operations are done as the unit moves steadily along this line.

At end of the assembly line, the unit is ready for degreasing. It is lowered on an automatically controlled carrier into the degreasing tank. In the degreasing operation the operator pulls the unit on the carrier and presses a button. An electric hoist lowers the carrier into the tank. A time-control switch operates when the unit has been degreased, and the hoist raises the carrier up to tank level. In the interval between lowering and raising the carrier, the operator prepares the next unit for degreasing.

Before this electric hoisting and time-control device was installed, the operator had to lift the unit on a carrier. Hoisting was done by an air cylinder. It was necessary for the operator to watch the degreasing operation because he had to control the degreasing time. At times he did not leave the unit in long enough to clean it properly; at other times it remained in too long, resulting in loss of time. One operator with one tank now handles the production that would have required two operators and two tanks under the old method.

One Man Does Work of Two

To handle units to the finishing conveyor, an air-lift table is used. As units come from the degreaser they are pushed off on a slide which conveys them to the top of this lift table. This top is bolted to an air cylinder fastened to a sturdy metal frame. When the operator opens the foot-operated air valve, the top rises until it reaches the right height for hooking the unit on the monorail finishing conveyor. A chain attached to the table top operates the valve to stop the table automatically at the right height. When the operator steps on his pedal a second time, the table top goes back to its low position.

This operation formerly required two men, and was a heavy lifting job. Now one man performs it because no lifting is necessary.

No handling is done during the finishing process, the units remaining on the monorail conveyor. Trimming and packing of finished units, now done on a gravity roller conveyor (soon to be replaced with a power slat conveyor), used to be done on benches with much manual handling. Units were lifted onto benches, trimmed, lifted again into trucks, and moved to packers.

Packing was done somewhat in the same manner. Units were moved to packing area, placed on packing benches, and crated. Considerable walking, trucking and lifting was done.

Under our present method operators are stationed on each side of conveyor, and each performs one operation. At the end of the line the unit is ready for shipment.

Various types of conveying equipment are being used for handling all materials and finished product. In each case, the type best suited for the particular job under present conditions, was installed. The result has been substantial savings in handling costs.

Every Production Executive should have this 148-page

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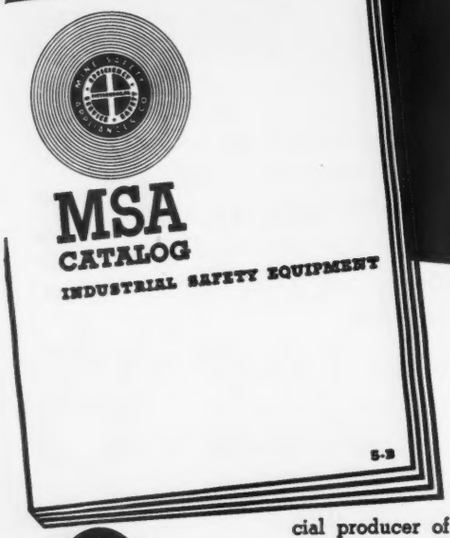

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WELDING FITTINGS BY **GRINNELL**

WHENEVER **PIPING** IS INVOLVED

The Budget Follow-Through

(*Continued from page* 63)

actual and budgeted profit and loss. The first is an over-all variation analysis of the same nature as the departmental form shown in Figure 2. After making proper allowance for variations from the budget, due to changes in volume, mix, price levels, and other external conditions, the gain or loss in operating control is determined for each expense element and its effect upon the final profit indicated. The second analysis contains similar data on a unit-value basis.

The report constructed around these analyses is composed of a brief summary of all facts, cost trends, and constructive information concerning each of the elements that goes to make up the profit and loss budget. Major trends in sales are pointed out by type of industry, sales unit, and customer. The degree to which management's operating methods and cost reduction programs are being carried out is indicated by the unit value and gain or loss in operating control, for the manufacturing, selling, and administrative expenses. Unfavorable trends due to either external or internal conditions are quickly recognized and revealed to management through the use of such a report.

A similar summary of all inventory conditions and trends is given by the inventory report. This includes schedules showing the monthly and year-to-date inventory and turnover data on all major items.

The chief executive regularly receives only those performances vs. budget reports covering the financial section of the budget, together with the expenditure and unit cost summaries for the major divisions. However, copies of all other budget reports are held available for his use should he require them.

The Long-Range View

Briefly reviewing the budget system discussed in this and previous articles, it is evident that the budget, when properly installed and operated, furnishes management with a long-range view upon which to base future plans and policies. It then coordinates the activities of the entire organization toward the achievement of both the current profit goals and the long-range programs. Moreover, through reported comparisons of actual and budgeted performance, management is advised of unfavorable internal and external conditions in sufficient time to take the necessary corrective measures.

To obtain the full measure of success possible, any budgeted program must be endowed with certain virtues. It must have the complete support and faith of the entire organization. It must be operated with adequate manpower of at least average intelligence, whose honesty is unquestioned and whose broad views are respected. Finally, an extra measure of common sense and good judgment must be liberally sprinkled through the entire budget organization and program.

With these requirements fulfilled we believe the complete budget system, as operated by Talon, offers management a most effective aid in insuring future profit and success.

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Lower views show a NEMA Type 1-A enclosure with gaskets on overload relay door and with oil-tank sealing against gaskets, for cement mill application—self-contained ammeter indicates the load on the motor at all times.

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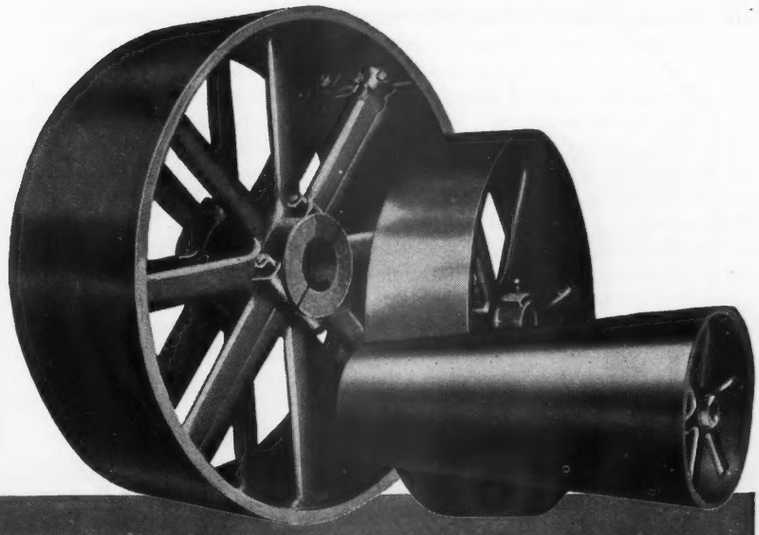
(*Continued from page* 65)

brushes, but eventually it was decided that the glue was unsuitable. Many types of adhesive, both hot and cold, were tested, but none seemed to have the required properties. Sodium sili-

Wood's CAST IRON PULLEYS



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cate was used for a period, but, although it was successful from the point of view of drying time, it was too alkaline, affecting the hands of the operators and bleaching the wrappers.

A special glue for this job was therefore developed from a casein base. This glue was easy to work and eliminated all the scrubbing motion necessary with the hot glue. Gluing now consists of one dip of the brush and one sweep around the edge of the wrapper. Since the paste is diluted in cold water, the heating elements were discarded. The glue is also sufficiently penetrating to soften the ends of the wrappers and cause them to stick, which eliminated the need to stack the boxes on their ends. The drying time also is reasonable.

The appearance of the pack is an improvement on the hot glue; whereas the latter left the box with a brownish discoloration and a hard brittle end, the new paste dries out colorless, and does not harden.

The glue is prepared in the factory, and one operator makes enough in one hour to last for the day.

A process chart of the completed operation under the new conditions is shown.

The results, from the time the operation was first studied, were as follows:

Labor Cost: Decreased by 50 per cent on the total operation of supplying, wrapping, etc. The operation was simplified and the operators were less fatigued at the close of the day's work.

Output: Increased by 200 per cent.

Pack: Appearance improved.

Savings: In labor, at the rate of $1,293 per annum; in adhesive, at the rate of $1,214—a total yearly saving of $2,507.

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Factory Survey Shows Likes and Dislikes for NLRB

(*Continued from page 66*)

word."—*Factory manager, paint and varnish, Michigan (500).*

"I do not favor laws that have to be administered, interpreted, or enforced by boards, bureaus, or commissions . . . according to the ideas, leanings, and prejudices of the appointed bodies. Further, it gives too much power to those who are authorized to appoint those bodies and reduces them to a dangerous political group."—*Plant manager, automotive, Michigan (4,500).*

"Encouraged by the Wagner Act and by discriminatory decisions of the Labor Board, there seems little doubt that the trend of labor unions is toward controlling not only labor regulation but also selection of personnel and control of output in our entire industries. In a short time this could bring about the collapse of our entire industrial structure."—*General superintendent, printing and converting, Wisconsin (500).*

Liberals

"Regardless of our own experience, we feel that, if the Labor Board would be permitted to function with the cooperation of employers, a few years would see the elimination of strikes and strife between capital and labor . . . The peace that has existed between the railroads and the railroad brotherhoods is an indication of what may be accomplished by recognizing the inevitable and that is that labor has a right to bargain collectively and is entitled to a living wage. It is my humble opinion that the only thing that threatens our political and economic democracy is the antagonistic attitude of employers toward liberal legislation for the protection of labor."—*President, automotive, Illinois (225).*

"Top management must learn to work closer with labor under government regulations. It can be done and

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A NEW TYPE OF FLUORESCENT TWIN-LAMP LIGHTING UNIT!

Following the same exacting laboratory and engineering tests employed in establishing quality standards for the Dome, Symmetrical Angle and Deep Bowl Reflectors, the RLM STANDARDS INSTITUTE has developed precise RLM Specifications for a 48" Fluorescent Twin-Lamp Unit . . . especially designed for general illumination of Industrial and Commercial locations.

This unit makes available a new type of lighting. Depending upon the mounting heights, spacing and arrangement, 18 to 42 footcandles of daylight quality illumination are distributed upon the surface to be lighted. By mounting units close together end-to-end to form continuous lines of light 8 to 10 feet apart, an unusual improvement in illumination is obtained.

Salient points of these new units made in accordance with the new RLM Specifications are:

A. *Porcelain Enamel Reflecting Surface for diffusion and durability.* Time has proven the durability, sustained efficiency and low maintenance cost of porcelain enamel. It is not affected by heat, cold or atmospheric conditions. It is easily cleaned.

B. 78% *Light Output Efficiency.* The design of the reflector, spacing of the lamps and high efficiency of the porcelain enamel reflecting surface combine to produce an unusual high light output efficiency.

C. 72-1/2% *Degree Cut-off.* An RLM cut-off standard for over 20 years and now generally accepted as good lighting practice. Insures adequate shielding of the light source to minimize glare. In addition the ends of the unit are closed to further protect the eye.

D. *Uses two 48" Mazda Fluorescent Lamps.* Approximately 100 watts used by lamp and auxiliary.

E. *New Type Auxiliary Corrects Power Factor to 90% or Better and Minimizes Flicker.* Also equipped with removable and renewable auxiliary starting switches located in the socket.

F. *Equipped with Auxiliaries Approved by the Underwriters' Laboratories.* All auxiliaries used in RLM units carry the approval of the Underwriters' Laboratories.

Thus, today, purchasers and specifiers of this new type of Fluorescent Lighting Unit will do so with the same confidence they have learned to place in other lighting units bearing the RLM Label. For this mark of lighting efficiency and lighting effectiveness has become known throughout industry and business as a certificate of uniform quality . . . a warranty of confirmation to important quality specifications essential to highest light output and lowest maintenance cost.

Consult your supplier of RLM Reflectors, or write Institute, for Specifications and complete information about the effect of this new type of lighting on workmen's efficiency and the effective display of merchandise.

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business will function better when management recognizes this as a definite necessity."—*Assistant to president, optical, New York (1,500).*

"I feel that if half the money companies are paying attorneys to fight NLRB cases were used in employer-employee activities, educational, social, etc., most of the trouble would end. In other words, fewer attorneys, more psychology, less stubbornness, more persuasiveness."—*Secretary, automotive parts, Wisconsin (50).*

"The NLRB seems unfair but may not be in the light of what it thinks the act intended. The act has offset the overwhelming advantage of the employer, often unfairly used. It went too far and also permitted interpretations which carry it further—hence it creates another unfair advantage which will not diminish but increase the causes of labor disputes."—*Vice-president, foundry, Illinois (1,000).*

Middle-Grounders

"The NLRB is contrary to the spirit of our government in that it combines in one small group of men the powers of all our judicial and law enforcement agencies. To correct this, it should function more like a grand jury—to take evidence and bring indictments that would be tried before a proper court in accordance with our established procedure." — *Vice-president, cast-iron pipe, Pennsylvania (500)*

"Rewrite the act to make unions and their officers legally and financially just as responsible as their employers."—*Vice-president, candy, Ohio (150).*

"The worst defect in the administration of the act is the fact that the board is judge, jury, and prosecutor, and its decisions are not subject to full court review."—*President, lumber, Washington (80).*

"Any plan to change the representation of the board to make it non-partisan and free from political influence should be endorsed. However, until the Wagner Act is changed to allow for more consideration of the rights of employers and to recognize the necessity of liability to penalties for both employers and unions, the NLRB can be nothing but a tool of labor organizers."—*Personnel director, domestic appliances, Michigan (4,000).*

"It seems to me that unions and other organizations should come under the Sherman anti-trust laws as much as corporations engaged in manufacturing."—*Vice-president, machinery, Indiana (150).*

"A board of this kind could be put to good advantage for all, but it must be run on a fair and equitable basis. We would welcome any change . . . which would result in an examining board that would at least *try* to be fair to *both* labor and management."—*Junior executive, glass, Calif. (300).*

"There are no rules by which the employer can be guided in his actions concerning the labor board. What goes for one case does not go for another. Only by appearing before the board does an employer know just where he stands."—*Planning engineer, machine tools, New Jersey (350).*

"The law should be so stated that the personnel of the board will have little effect on the decisions and policies of the act."—*Assistant works engineer, soap, New York (350).*

"What success there has been through the Wagner Act has been wholly due to the good parts of the law and not to any fairness on the part of the board."—*Superintendent, paints, Michigan (100).*

"The law as written could have been satisfactorily administered by the right kind of board."—*Factory manager, automotive, Maryland (1,000).*

"Hearings should be conducted in

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With SKILSAW you speed up ALL your sawing . . . save considerably on material handling—you reduce labor costs . . . *so you increase profits!* You can use it anywhere in the plant for cutting old flooring, trimming doors, opening shipping cases, cutting freight car bracing and machinery skids . . . and for many production sawing and grooving jobs.

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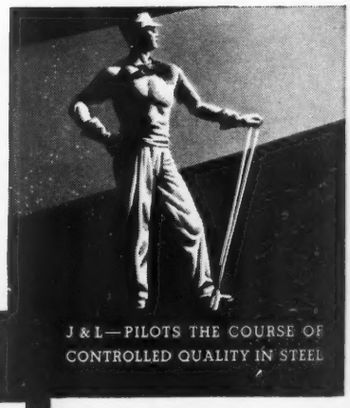

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accordance with judicial practice in examination of witnesses. At present witnesses are coached openly and too much extraneous material is written into the record."—*Vice-president, steel, Indiana (150).*

"NLRB must be definitely on the labor side, but I am surprised they can afford to be so obvious about it."—*Plant manager, roofing, Ohio (175).*

"The writer personally feels that the Wagner Law, if modified and properly administered, would benefit both industry and labor."—*Assistant secretary, sash and doors, Iowa (700).*

"Men sitting on the board should be there because of their ability to be square shooters from past experience, not because they are recommended by members of some political party. The law points in the right direction, but it is so full of political holes that it is of very little use."—*Secretary-treasurer, manufacturing, Indiana (100).*

"We have no objections provided their officers are of the type that are sincere and are big enough to be able to look at a picture from both sides. Some kind of legislation must be passed to eliminate rackets in the unions. There is nothing wrong with the National Labor Relations Board if the men on the board can be big enough to see all angles of a situation and hand down a decision looking at it fairly from all viewpoints."—*General manager, automotive, Michigan (700).*

"After a meeting at which he spoke on the work of the board, a very prominent regional member told me that he privately considers some of the features very unfair and that an employer's chances as against employees' are no more than one in ten. He said: 'I'm just a poor boy trying to make a living and my holding my job depends on the way I'm told to apply the law—not the way I feel about it myself.' He considers it purposely unfair to employers and that justice to all is not its aim."—*Proprietor, baking, Pennsylvania (25).*

These are the views of well-informed industrial employers, based on personal observation, the comments of other men in industry, and reports in the daily news. *We turn now to a special segment of the voters, those who have had direct contact with the labor board.*

Unfairly Treated

More than half of them believe they were unfairly treated by the board or its representatives. Their opinion on this point has little to do with their general attitude toward board and act, apparently, for they break down substantially in the same way as the larger group. About 32 per cent are "irreconcilables," about 15 per cent are "liberals," and the rest are "middle grounders."

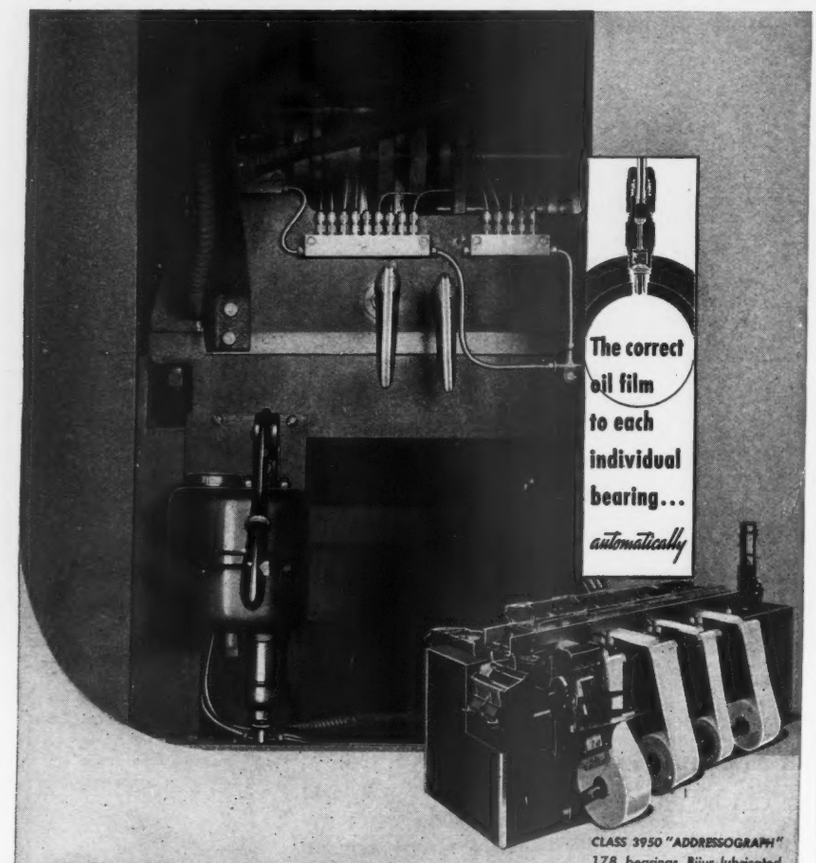
All the following comments, strangely enough, came from men who felt the board had treated them *fairly:*

"The Wagner Act is the rottenest piece of legislation ever enacted and should be repealed."—*Vice-president, furniture, Ohio (700).*

"I believe the Wagner Act should be repealed."—*General manager, buttons, Iowa (150).*

"In my opinion the Wagner Act, the Fair Labor Standards Act, and the Social Security Act have been used by the federal administration to coerce state administrations and for political purposes. The voters have been deceived. They have been told of benefits without being informed that they were paying for the benefits. Why should we adopt European methods to remedy our mental conditions?"—*Comptroller, electrical products, Indiana (350).*

"I believe the Wagner Act has served a useful purpose but that it has given labor the superior strategic position and that it has increased, rather than decreased, the causes of labor dis-



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Disston *Di-Mol* Hack Saw Blades are tough. They'll meet the trying feeds and speeds developed in machine sawing. They need no coddling in the hands of shop men.

And Disston *High Speed Steel* Blades are efficient in cutting metals of extreme toughness: high speed steel, die steel, chrome-nickel alloys and the like.

With a hundred years of experience, Disston stands ready to serve you, whatever materials you cut. Call your distributor of Disston Hack Saw Blades today. Or write to Henry Disston & Sons, Inc., Philadelphia.

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DISSTON HAS THE EDGE

putes."—*Production manager, plastics, New York (1,250).*

"It seems to me that the Wagner Act has done one good and beneficial thing for the country and industry—it has forced industry to realize that, for the general welfare, capital and labor must cooperate more closely. But I believe the law as it stands is too one-sided. It has reversed the *status quo.* The law should not be repealed but revised."—*Superintendent, optical, New York (400).*

"Our company received a fair decision because of an unusual and fair-minded trial examiner."—*Superintendent, machinery, New York (1,000).*

"Although we were fairly treated by the Board, prior to and during the hearing, there were a few highly objectionable features which were revealed at the hearing: (1) the bringing about of the necessity for the holding of an election was promoted almost entirely by outside organizations; (2) membership applications were forced on our men by the union organizers and, as a special inducement for signing, the payment of dues was suspended by the union until such time as the union 'did something' for the men; (3) at the hearing there was no union lawyer, the union being represented by their international organizer who sat at the counsel table of NLRB consulting with them continually and cross-examining as well as directly examining numerous witnesses.

"As a result of our experience, we feel that it is manifestly unfair to allow unlimited activity by outside labor organizers with no right by employers to answer untruthful statements, threats, and ruthless tactics. Our hands are tied, the union activities are without control."—*Assistant superintendent, printing, Connecticut (150).*

Remember, all the last seven quotations came from men who felt that their own companies had been fairly treated by the board. Now let's hear the testimony of those who felt they were *un*fairly treated:

"After a series of hearings the board declined to hold an election but required the company to withdraw any recognition of the employees' association. It was evident that the purpose of this was to allow labor organizers to attempt the formation of a union affiliated with one of the larger groups."—*Chief chemist, paint and varnish, New York (75).*

"I believe the Wagner Act, fairly administered, to be essential to our present industrial set-up."—*Plant superintendent, electrical, Ohio (250).*

Without Bias

"A labor law, to be effective, should be without bias, guaranteeing the rights of both parties. Matters affecting an industry as a whole should be negotiated on an industry-wide basis. To secure eventual peace, a system of arbitration will have to be worked out covering everything but matters of principle."—*Efficiency engineer, glass, West Virginia (1500).*

"A betterment of labor relations in the United States can only be brought about by good labor laws. As a heavy traffic needs good roads and traffic lights, made and set up by competent men, so are the needs of a highly developed industry. Our industrial magazines and engineering societies should make it their combined effort to set up an organization and work out bills for labor laws for our government."—*Superintendent, toys, New York (100).*

"The independent union applied for an election to determine bargaining rights. The NLRB refused to call an election because there was no labor trouble. They finally advised the independents to withdraw the application as they had no intention of holding an election. The independent union had 55 per cent of eligible employees as dues paying members. This action may

PHONE RYERSON any time . . . for any amount . . . or any kind of steel. Your order will get Immediate Action. The steel is in stock, and will be delivered promptly — where and when you need it.

When steel inventories are low, when you need unusual sizes or analyses, when non-uniform quality steel hinders production, call Ryerson. Over 10,000 sizes, shapes, and kinds of steel and allied products — from structurals to stainless, from heat treated alloys to nuts and bolts — are included in Ryerson Certified Steel products. All are closely controlled as to analysis, accuracy, finish, etc. and each represents the highest quality in that particular class and type of material.

Ten strategically located plants assure prompt, dependable service. Draw on the one nearest you. We'll gladly send a Stock List.

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RYERSON CERTIFIED STEELS

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Accurate Cost and Production Control

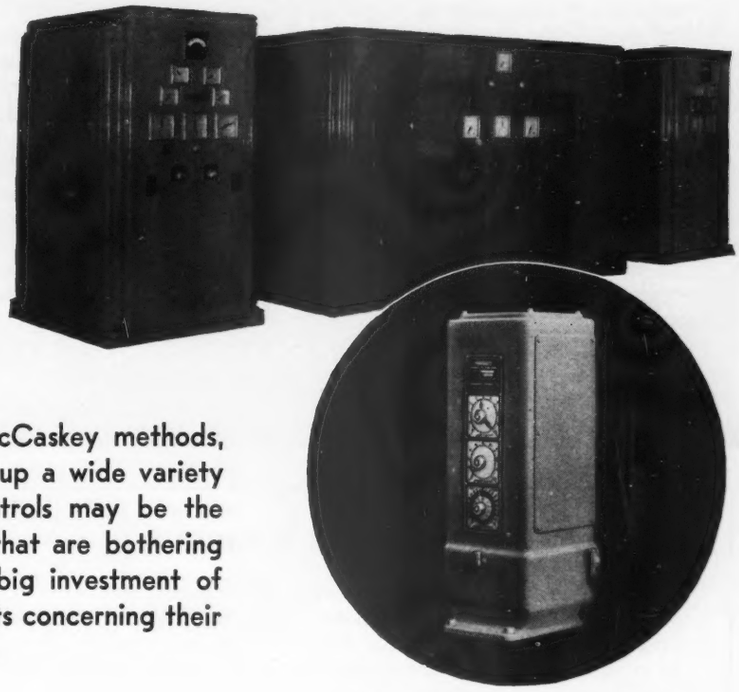
"at a great saving" in time, labor and supervision with

McCASKEY

"Our initial McCaskey installation provided cost and production control and its advantages became apparent very soon. Accurate cost and production records were more readily available at a great saving in the time and labor required to keep the records. The status of every production order in process was made apparent at a glance.

"Our subsequent installation of the McCaskey system of machine loading has minimized the supervision necessary to assure production in the proper sequence for assembly requirements and shipping schedules. We are very well pleased with the results which have been obtained."

This experience of The Woodward Governor Co., Rockford, Ill., outlined by Mr. Ward Ring, Supt., suggests how McCaskey Industrial Controls might simplify production planning and control in your plant. Woodward governors control the speed of water wheels, internal combustion and steam engines and turbines, and the pitch of adjustable blade airplane propellers.



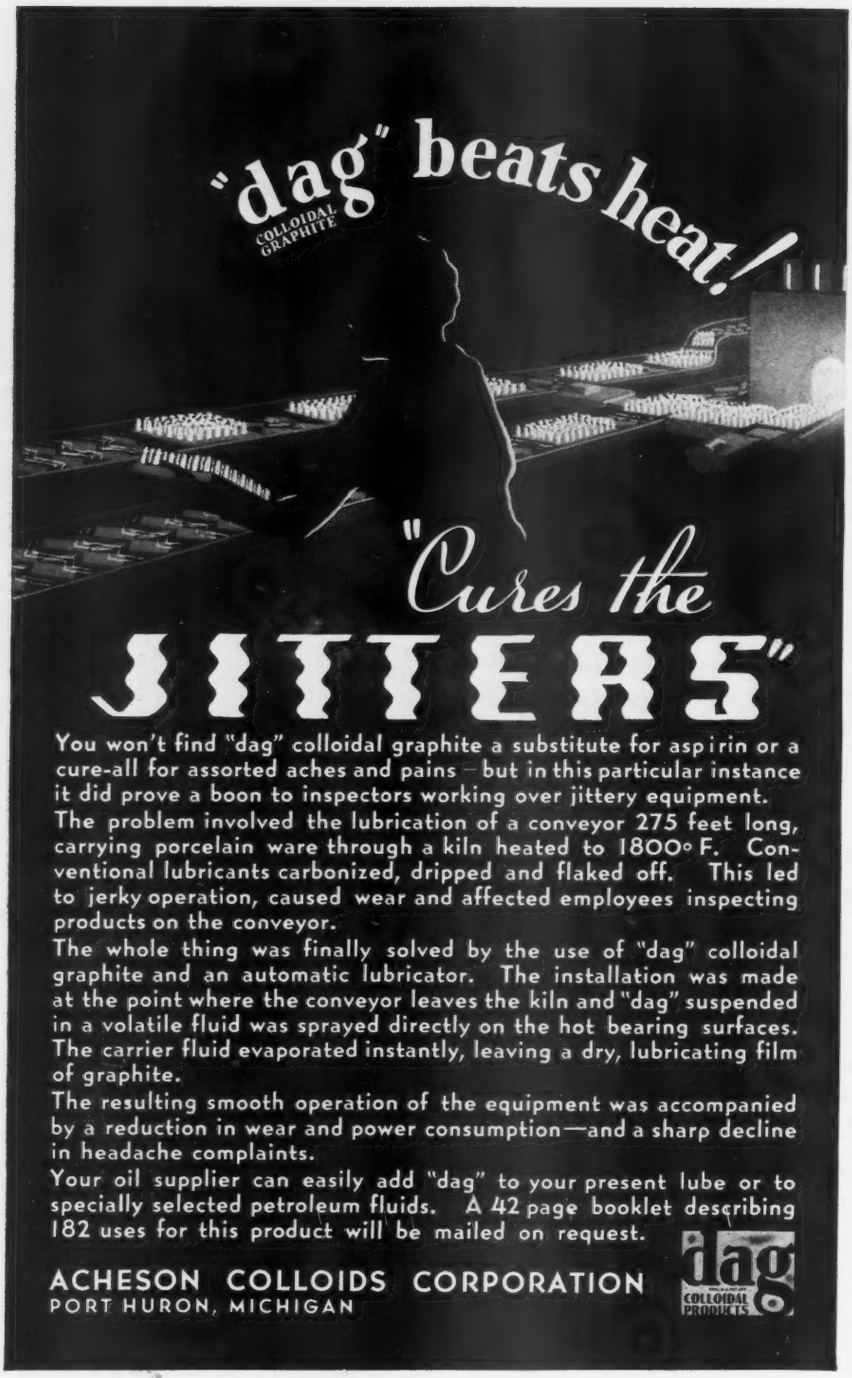
Above, Woodward governing equipment in the Boulder Dam Power Plant; below, on internal combustion engines

Hundreds of manufacturers are using McCaskey methods, equipment and factory forms to tighten up a wide variety of production controls. McCaskey Controls may be the answer to the excessive costs or delays that are bothering you now. And, they do not require a big investment of time or money. Let us give you more facts concerning their application to your specific requirements.

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCASKEY INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • MAINTENANCE • TOOLS • COSTS • PAYROLL



You won't find "dag" colloidal graphite a substitute for aspirin or a cure-all for assorted aches and pains — but in this particular instance it did prove a boon to inspectors working over jittery equipment.

The problem involved the lubrication of a conveyor 275 feet long, carrying porcelain ware through a kiln heated to 1800° F. Conventional lubricants carbonized, dripped and flaked off. This led to jerky operation, caused wear and affected employees inspecting products on the conveyor.

The whole thing was finally solved by the use of "dag" colloidal graphite and an automatic lubricator. The installation was made at the point where the conveyor leaves the kiln and "dag" suspended in a volatile fluid was sprayed directly on the hot bearing surfaces. The carrier fluid evaporated instantly, leaving a dry, lubricating film of graphite.

The resulting smooth operation of the equipment was accompanied by a reduction in wear and power consumption—and a sharp decline in headache complaints.

Your oil supplier can easily add "dag" to your present lube or to specially selected petroleum fluids. A 42 page booklet describing 182 uses for this product will be mailed on request.

ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

dag COLLOIDAL PRODUCTS

Do You Read A Routed Copy?

If you are on a route list to read Factory Management and Maintenance, you probably pass it along without having the chance to read just the article that you would like best. Routed copies have a knack of arriving at inconvenient times—late—and often in poor condition.

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FACTORY MANAGEMENT *and* MAINTENANCE
330 WEST 42ND STREET NEW YORK CITY

have been properly motivated but to us it seemed definitely pro-CIO."—*Assistant general manager, electrical, Pennsylvania (500).*

"Without knowing whether CIO organizers had the majority or not, we were deliberately told by NLRB that the CIO union represented the majority and we were therefore charged with refusal to negotiate. Then followed several meetings with representatives of the union without results. The writer then requested a vote. After a delay of six or eight weeks, the case was thrown out and the charges withdrawn. It is therefore obvious that NLRB did not, at the start, have sufficient data or proof that the organization had a majority and that we were not given the true facts in the case."—*Senior partner, buttons, New York (500).*

"As the day approached for our hearing, we were advised by one who was indeed in a position to know whereof he spoke: 'Tomorrow you will be tried on the evidence presented, not on the facts in the case'."—*Factory superintendent, textiles, Arkansas (100).*

Recruiting Protests

Predominant in the quoted comments, and in all the rest, are three constantly recurring protests: that the board has aggressively aided unionization, especially CIO unionization, that it should not be judge and prosecutor, and that labor unions and their leaders should be made responsible for their acts under the law.

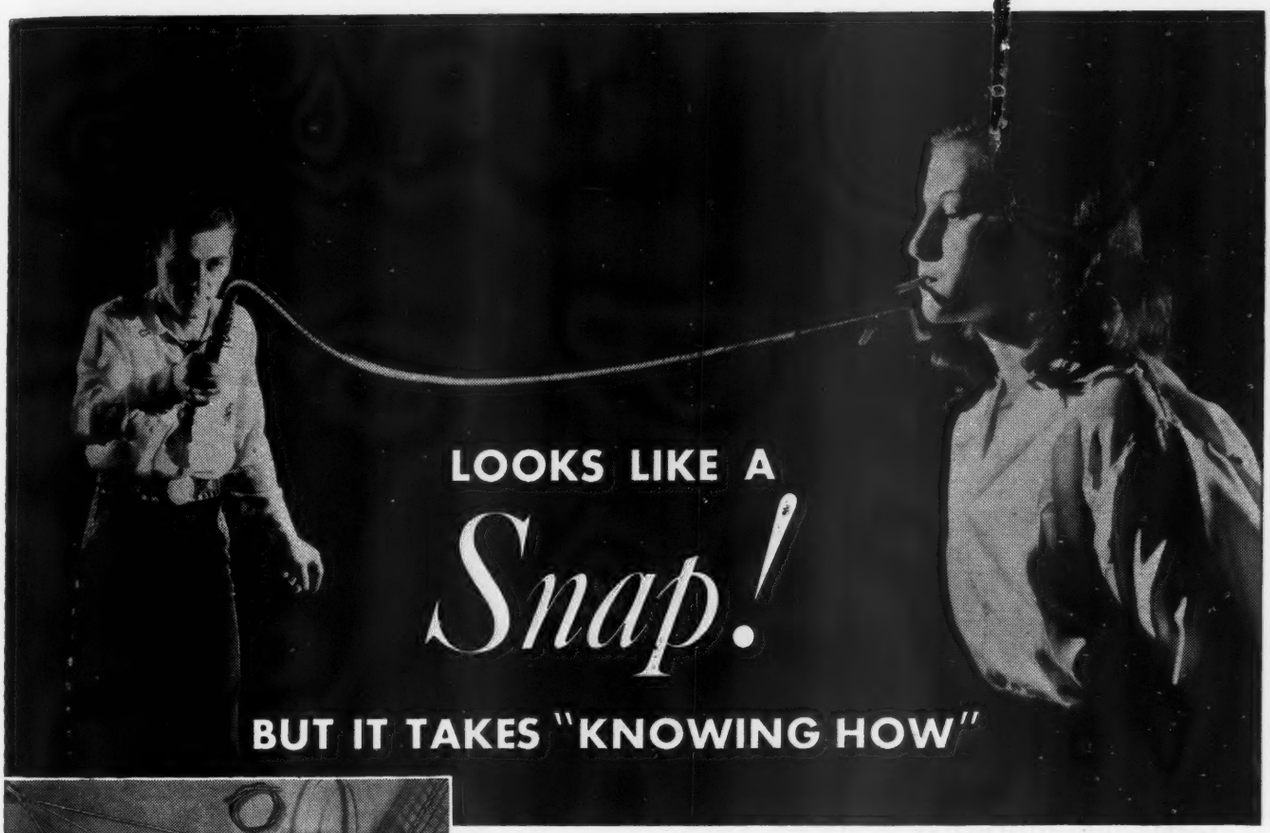
The board has stoutly defended itself against the charge that it is pro-CIO. But the defense has not been convincing to management, the public, or the American Federation of Labor. Regardless of the merits of the charge, the fact that the board has permitted such an impression to exist constitutes the most serious tactical error in its record and one that may yet prove fatal. If all of organized labor and most of the public were back of the board, management's protest would be of little avail. As it is, much of labor and most of the public (as reflected in the Gallup polls) share management's belief that the board is deliberately stimulating CIO's mushroom growth.

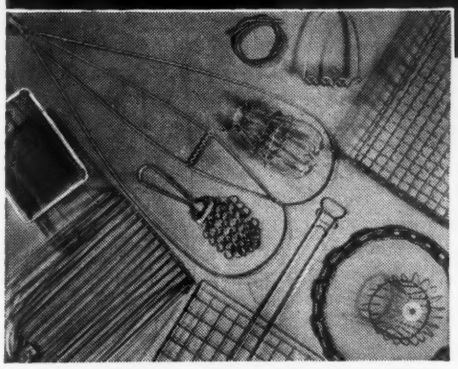
If the day should ever come, however, when the long-sought cooperation of government and business becomes a reality, then government could make no better start than to:

1. Separate the judicial and administrative functions of the Board.

2. Replace the present Board with one composed of men already noted for impartiality in other positions.

3. Oblige labor unions to incorporate,





Premier Spring Wire · Weaving Wire · Pin Wire · Bolt, Rivet and Screw Wire · Broom and Brush Wire · Pinion Wire · Basic and Bessemer Screw Stock · Premier Tested Welding Wire · Flat Nut Stock · Hair Pin Wire · Mattress Wire · Music Spring Wire · Piano Wire · Amercut Cold Finished Steel Bars · Pump Rod Bars · Wool Wire · Wire Rods · Also U·S·S Stainless and Heat-Resisting Wires.

...and it takes "Knowing How" to put Quality into Wire

MAKING wire is one thing . . . putting quality into it is another. We do both. Over 100 years of wire-making experience goes into making American Quality Wire a product that is of high quality and uniformity . . . the kind of wire that gives trouble-free production.

American Quality Wire is a product that is carefully checked from mine to mill to machine. Every step in its production is controlled by our own skilled engineers and workmen.

Whether you make one or many products out of wire, you will find it well worth your while to investigate our facilities for supplying you economically. American Quality Wire is produced in a complete range of sizes, grades, shapes and analyses. Our plants are strategically located so that deliveries can be promptly made to meet your schedule of production, and our Sales Department and Engineering Staff will be glad to assist you in determining which type of wire will best suit your own particular requirements.

AMERICAN STEEL & WIRE COMPANY

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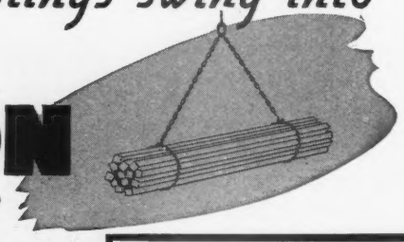
UNITED STATES STEEL

When your Slings swing into

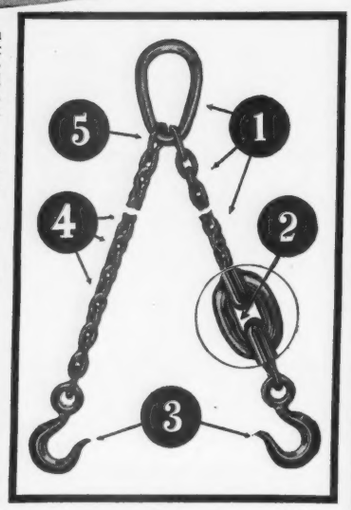


ACTION

WHAT ARE THE SAFETY ODDS?

There's strength to spare—*safe*, enduring strength in HERC-ALLOY Sling Chains. Designed and built by chain experts of Herc-Alloy—one of the toughest metals known to industry—these improved sling chains are winning records for strength and endurance on all types of applications. Just check these highlights:

1. Heat Treated HERC-ALLOY throughout the entire chain for maximum uniform strength.
2. Links are INSWELL Electric Welded by a new process fully covered by Patents.
3. HERC-ALLOY Heat Treated Hooks give maximum strength at these vital points.
4. Short, narrow links reduce to a minimum the danger of bending or gouging when used around sharp corners.
5. All Joiner Links are of Heat Treated HERC-ALLOY. *Descriptive literature on request.*



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COLUMBUS-McKINNON CHAIN CORPORATION

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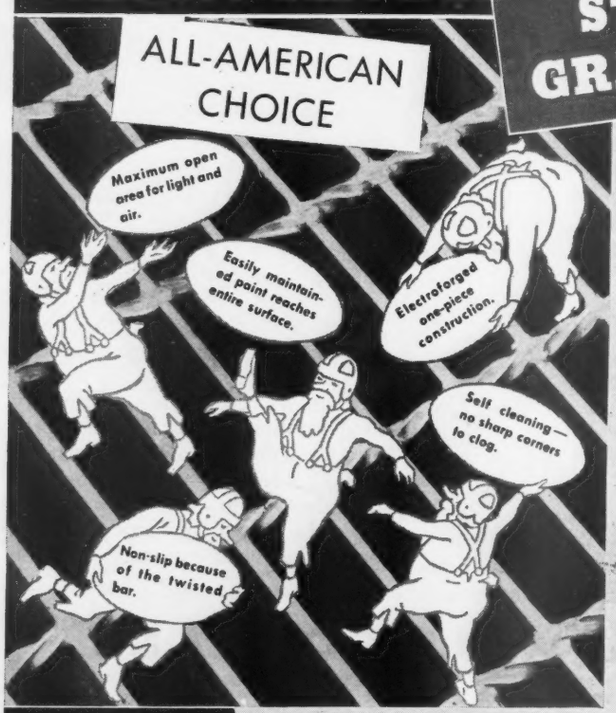
ALL-AMERICAN CHOICE


Maximum open area for light and air.
Easily maintained paint reaches entire surface.
Electroforged one-piece construction.
Self cleaning—no sharp corners to clog.
Non-slip because of the twisted bar.

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Paper weight size sample . . . Just fill in and mail the coupon.

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SEND GRATING SAMPLE TO

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make their officers financially responsible and their financial affairs subject to public audit. Management would then be ready to cooperate. The results of this survey prove that it would.

•

Batt Says Idle Workers Are Industry's No. 1 Problem

Men out of work are management's "number one" job and reactions experienced by these men are a greater danger than all the "isms," was the opinion expressed by W. L. Batt, president of SKF Industries and chairman of the Business Advisory Council of the Department of Commerce, when he addressed the annual convention of the Society of Automotive Engineers.

"I am not nearly as much concerned with the menace of the 'isms'," he said, "as with the certain reactions of men out of work. Because it is our number one danger, it is our number one job." What is taking place now and what happens in the near future will help determine whether we are to have "a competitive form of economy and of government, or a system of government ownership, government control, and central authority."

On the subject of employer-employee relations, Mr. Batt believes that "collective bargaining as a guaranteed right of labor is here to stay."

"How fast unionism as the force to implement the collective principle for labor, is to grow, will be considerably influenced by our attitude as employers. The employee will have to be convinced that we honestly agree with his right to be free from unfair discharge, his right to bargain collectively, his right to belong to a union if he wants to.

"It seems to me inevitable that the pendulum will swing still further in the direction of security for labor. To the extent that it is not provided voluntarily by private enterprise it is likely to be provided by legislation or judicial interpretation."

Because the man in the street feels that business has let him down, business has lost much of his confidence, Mr. Batt stated. "If he gets the idea that our criticism of the Wagner Act, the Wages and Hours Act, and similar legislation is for our own selfish interest and so that we can be freer to take advantage of labor, then we can be prepared for legislation far more stringent than anything we have seen so far."

To meet these problems and the dangers inherent in them, Mr. Batt appealed for a careful study of ways of smoothing out the employment cycle,

(*Continued on page* 173)

particularly by leveling production, building up inventories in slack times where that procedure is practicable and safe, and through "more reasonable" handling of "planning and purchasing requirements as they affect our suppliers."

•

Industry is Urged to Write Its Own "Constitution"

"Businessmen of America—unite! You have nothing to lose but your chains." With this paraphrase of Karl Marx, Donald Richberg, one-time NRA head, exhorts American industry to plan for its own self-government and hence its preservation in democratic, capitalistic form.

By so uniting, Richberg told a recent meeting of the Chicago Association of Commerce, business could itself prevent the economic breakdowns that occur "with terrifying frequency."

"If the business leaders of the nation openly wrote and adopted a constitution of economic self-government, responsive to the genius of the American people, and proceeded aggressively to establish and maintain a sound and democratically controlled industrial system, if they would fight the good fight for their faith with as much vigor and conviction as inspired those who wrote and established our national constitution, they would win over any opposition."

•

Another Move to Beat a Skilled Labor Shortage

Let business suddenly soar, then watch the mad scramble to find workers with certain special skills. There need be no shortage, though, for men who know how to wield a spray gun. The DeVilbiss Company (Toledo) has been anticipating any such situation with schools for industrial painters and others who want to learn spray-painting. Training periods for the first half of 1940 have just been announced.

•

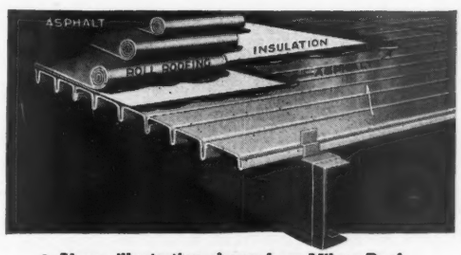
A Management Dilemma—Wages and Hours vs. Merit Rating

A new headache being experienced by companies over a wide area as a result of the combined effects of increased industrial activity, the Wages and Hours Law, and merit rating provisions of unemployment insurance laws in various states, is cited by the American Management Association.

Improvement in business, the Association points out, has made it necessary for companies either to put employees on longer hours or to hire additional workers. If the former is done, the concerns must pay time-and-one-half overtime under the Wages and Hours Law;

"We're specifying Milcor — to get the advantages of steel deck — plus Milcor construction features."
"Milcor? Then this gets my O.K.!"
For large and small industrial buildings
Front Office and Engineering Department approve the

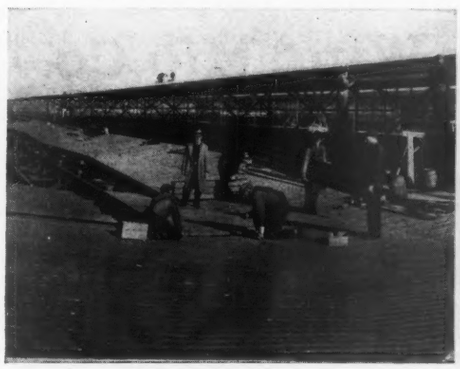
Safety . . . Permanence . . . Long Run Economy of MILCOR Steel Roof Deck

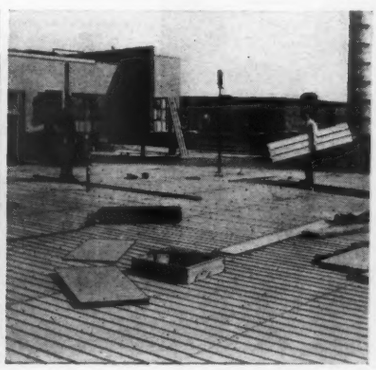


- Above illustration shows how Milcor Roof Deck is adaptable to real insulation, where required, with standard types of insulation board.
- *Below, left:* Milcor Roof Deck used on one of largest roof deck jobs in the world, at *Borg-Warner Corp., Rockford, Ill.*
- *Below, right:* Milcor Steel Roof Deck being erected at Ohio Steel Foundry Co., Lima, Ohio.

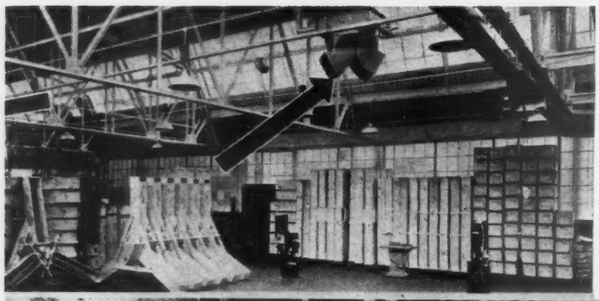
Permanent protection with *low over-all costs* uphold your judgment in specifying Milcor. Light weight, easily handled. Requires relatively light, less costly supporting structure. Quickly attached. Unique off-set nests sections in record time, with plates firmly interlocked. Smooth deck provides long life for roof covering . . . Protect your buildings with fireproof Milcor Roof Deck. Our engineering staff is ready to help you. Write for bulletin . . . *Milcor Steel Company, Milwaukee, Wisconsin.*

F-135



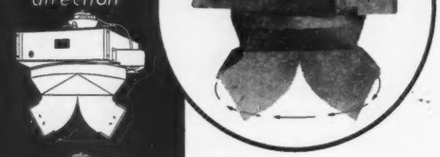


Heating Buildings



Two Industrial Installations of Revolving Discharge Type Wing Unit Heaters.

Diffuses heat in every direction



A new sensation of fresh, live, invigorating heat is created by this heater with the discharge outlet that slowly revolves.

No hot spots, no cold spots, no drafts can exist because the moving air stream produces an active state of air turbulence which results in a constant gentle air motion throughout the working area.

Even in plants where equipment or other objects would obstruct the flow of heat from a fixed discharge, the constantly changing direction of flow accomplishes complete coverage to the walls and corners of the plant.

Send for Bulletin H-7

L. J. Wing Mfg. Co.

162 W. 14th Street — New York, N. Y.

Wing Revolving Discharge Featherweight UNIT HEATERS

Floodlights of Heat

if additional temporary men are employed, they will have to be released when the demand falls off, which means that the companies will be penalized with a higher unemployment insurance tax beginning in 1941, 1942, or 1943, depending on the state in which they operate. Unemployment insurance merit rating, under which a concern's unemployment tax contribution is based on its rate of personnel turnover, is a feature of the unemployment insurance laws in 40 states and territories.

"Either course of action involves additional expense," the Association states. "But if the heavier volume of production extends over a comparatively short time, many manufacturers believe that it will prove to be more economical to work longer hours and to accept the overtime penalties under the Wages and Hours Law."

"The record of experience on which employment insurance taxes will be based is now being made," the announcement continues. "If the turnover of employees is high—if large numbers of workers are hired for a short period and then laid off—the result will be a higher cost of insurance in future years when merit rating becomes effective.

"Since the spread between rates of different companies in some states may go as high as four per cent of the annual payroll, the incentive for stabilizing employment and building up a favorable experience is becoming very real. Competing manufacturers will find this sizable difference in their tax rates an important advantage or a handicap, whichever the case may be."

•

Lincoln Foundation Announces $200,000 in Awards

Good example of what modern management is doing in the interest of low-cost production — which means more goods for more people—is found in the 2½-year program of scientific study announced by The James F. Lincoln Arc Welding Foundation, Cleveland.

Awards—458 of them, totaling $200,000, and ranging from $13,700 to $100—have been established for studies bringing out benefits of a social, economic, or commercial nature, such as reduction or elimination of hazards to safety and health, greater availability of comforts and conveniences through reduced prices, greater utility and durability of machines and structures as well as industrial benefits such as cost savings and other advantages in manufacture, fabrication, or construction.

Studies encouraged with a view to

A NEW FACTORY FLOOR THAT *SAVES WITH SAFETY*

Armstrong's Industrial Asphalt Tile provides an economical and durable floor for this shipping room of Doubleday-Doran Company, in New York City. This reinforced mastic flooring is ready for use as soon as it is laid.

IT'S wise economy to install new floors of Armstrong's Industrial Asphalt Tile in heavy trucking areas. For this material will save you money and make your plant a safer place in which to work.

In the first place, it is a mastic and resilient flooring, ready for use as soon as it is laid. Secondly, Armstrong's Industrial Asphalt Tile is extremely durable. The constant traffic of heavy trucking won't cause it to chip, crumble, or dust. This is important because floor dust is injurious to the health of workers, to delicate machinery, and often to finished products.

Floors of Armstrong's Industrial Asphalt Tile speed production. Trucks move faster on its smooth surface. Since workers enjoy steadier footing accident hazards are reduced. Working conditions are improved because glare is eliminated.

The first-cost of Armstrong's Industrial Asphalt Tile is low, and maintenance expense is extremely economical. Sweeping and occasional washing are the only attentions it requires. It can be used on raised, semi-exposed platforms. It will pay you to consider Armstrong's Industrial Asphalt Tile for *your* heavy trucking areas. Get all the facts, write today to Armstrong Cork Co., Building Materials Division, 1212 State Street, Lancaster, Pa.

FLOOR FACTS AT A GLANCE

Here are 8 important features of Armstrong's Industrial Asphalt Tile

1. Ready for use immediately after laying.
2. Highly resistant to denting.
3. Will not dust, crumble, chip.
4. Inexpensive to maintain.
5. Can be used on raised, semi-exposed areas.
6. Actually *improves* under traffic.
7. Provides safe footing for workers.
8. Dark colors reduce glare.

Armstrong's

INDUSTRIAL ASPHALT TILE FLOORS

USE THE COUPON!

Many advertisers in this issue of FACTORY have not only given you valuable information in their advertisements, but have made it easy for you to get even more detailed data on products and services that can save you money—by inserting coupons in their advertisements requiring only your name and address. Other manufacturers have made valuable catalogs available to you through the Catalog Service Page found on page 192 of this issue.

Use it. Tap the valuable information thus easily made available to you.

TOLEDO TRUCK SCALES

● The newest Toledo Motor Truck Scales bring you more important Profit-Guarding features than ever before. In the A. R. E. A., "Truckmaster", and "Truckweigh" lines there is every modern size and capacity — both in dial and beam types. Into these big Toledos go the same engineering skill and precision that have made Toledo Scale performance famous. Skilled Toledo servicemen are conveniently available in 181 cities for installation supervision. In a Toledo, you get Toledo Accuracy and Dependability all the way.

Get the *latest* facts . . . send for this valuable reference.

Start Right Now!

NO SPRINGS
HONEST WEIGHT

Get this FREE reference NOW

Send coupon to Toledo Scale Company, Toledo, O.

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Address_____

City_____ State_____

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creating such large-scale benefits will concern machines, products, and structures of all types, including automobiles, trucks, buses, airplanes, locomotives, freight and passenger cars, street cars, ships and boats of all types, buildings, bridges, houses, furniture, heating and air conditioning equipment, electric refrigerators, farming machinery, road-building equipment, as well as industrial machines and products of every conceivable kind.

Studies may bring out any and all social, scientific, economic, and commercial benefits that attest progress in industrial development. Studies must, however, report progress that can be attributed to application of the electric arc process of welding within the 2½-year period, January 1, 1940 to June 1, 1942. Such progress may involve one of the following (a) Redesign and manufacture or construction of an existing machine, structure, building, manufactured or fabricated product of ferrous or non-ferrous metals; (b) new design and manufacture or construction of a machine, building, etc. as in (a); (c) organization development, and conduct of a welding service; (d) development, planning, and performance of maintenance or repair work with arc welding.

•

Detroit Launches Drive for Industrial Peace

Industrial cities dislike to admit the existence of strife within their borders. But many of them have learned the value of frankness in inviting all elements of the community to join in an honest appraisal of a bad situation. As a rule, the situation has to be serious before this happens.

Now it is Detroit which, in the aftermath of the disastrous Chrysler strike, has gone in for some candid fact-facing. Hence the new Detroit Council for Industrial Peace. This group has announced itself with a series of well-worded full-page advertisements in the daily press. The ads lead up to an 11-point platform for industrial peace and an appeal to all "fair-minded citizens" to support it.

Here are the facts Detroit is facing: "Right now over 60 strikes are in progress in the city and are causing a loss of over 70,000 wage-days every 24 hours, amounting to a loss of almost $500,000 a day . . . Today it is known far and wide that present conditions do not make Detroit a good place in which to locate an industry. Many industries that helped to create a labor market for Detroit workers have already moved to other cities, still others are seeking an opportunity to move, thus decreasing the number of available jobs, reducing

Compare this fan
WITH CENTRIFUGAL BLOWERS
IN THE SAME PRESSURE RANGE

Lower Installation Cost — Less Power Consumption — Saves space and weight . . . and it *operates efficiently* against static pressures created by adverse winds, weather shutters, duct systems and pressure differences between interiors and exteriors of rooms. De Bothezat Axial Flow Fans operate efficiently against these forces because of their (1) proper blade design, (2) patented center disc, (3) new log-cone entrance ring. More air per fan diameter at slower speeds with reduced noise and blade erosion. Surprisingly low in cost. Guaranteed "code" capacities. Get all the FACTS . . . mail coupon below, today!

SERIES "35"

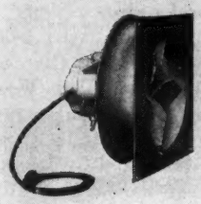
Attains peak efficiency at moderate and high static pressures. Available in sizes from 18 inch through 12 feet. Choice of direct or V-belt drive.

De Bothezat AXIAL FLOW DISC FANS

have NON-OVERLOADING POWER CHARACTERISTIC

Write today for FREE book!

AXIAL FLOW TYPE VOLUME FANS



TYPE W
For low or moderate static pressures. Low cost. Sizes: 8 in. through 16 in.

TYPE L
For large volumes of air at moderate static pressure. Sizes: 18 in. through 12 ft.

DeBOTHEZAT VENTILATING EQUIPMENT DIVISION
American Machine and Metals, Inc.
101 DeBothezat St., EAST MOLINE, ILLINOIS

Yes! Please send me complete information on DeBothezat Axial Flow Disc Type Fans.

Name .....

Address .....

City ..... State .....

● Production heads and welfare men in thousands of the best plants in the country, consider their Bradley Group Wash Fixtures as important as their production equipment.

The fact alone that 56% of the 1939 output of Bradley Washfountains went to past users is itself proof of the water—, time—, and space-saving advantages provided.

You can modernize your washrooms and have these advantages, too. Each Washfountain serves up to 10 men simultaneously with clean running water—and requires 1/10 the piping installation, because one Washfountain serves as many men as 10 individual wash bowls.

Section of the Norton Co., Worcester, Mass., washroom

Write for Washroom Plan Book

To help you modernize, or lay out washrooms for new buildings, our "Plan Book" will be mailed on request. Write for a copy with names of plants in your locality equipped with Bradley Sanitary Group Washfixtures. BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan St., Milwaukee, Wis.

BRADLEY
WASHFOUNTAINS and SHOWERS

Don't Miss April FACTORY SIXTH ANNUAL PLANT BUILDING SUPPLEMENT

the community's purchasing power, and adversely affecting the interests of every citizen."

Here is the remedy, which the peace platform suggests rather than unfolds: "Every effort, including bargaining, negotiation, and mediation, should be made by all concerned, both employers and employees, to eliminate industrial strife and the consequent heavy losses and suffering." Further, the council assails "alien propaganda" and urges that it be "recognized and resisted by every good citizen of Detroit."

Citizens who agree with the council's premises (including this: "Every man and woman in Detroit and every employee and his family benefit from the success and growth of the city's industries and suffer when the city's business does not prosper") are then invited to fill in a coupon and send it to the council.

"The results of these first four advertisements, which are really the start of a definite educational campaign, have been very gratifying," the council announces. "Thousands of coupons have come in from all walks of life and there is every indication of a civic awakening in the Detroit area."

The council's 29 directors represent a broad variety of manufacturing companies, plus two clergymen, an insurance man, and the president of a neighborhood business association, but only one (Dean W. Robinson, vice-president of Briggs Manufacturing Company) is directly connected with the big motor manufacturers.

News of the council's progress will be copied with interest, no doubt, by the papers of Toledo, Akron, San Francisco, Evansville, Ind., and Minneapolis, where similar programs—each having certain features in common but none altogether alike—have been launched in the past.

•

Supreme Court Passes an NLRB Problem to Congress

Whenever the National Labor Relations Board loses a trick in the lower courts it seems to have a trump ready to toss across the table in the U. S. Supreme Court. So it was again, when the nation's highest tribunal issued a ruling (in the Pacific Coast longshoremen's case, AFL versus CIO) that the U. S. Circuit Courts could pass only upon final actions of the labor board, not on its procedural rulings.

In this instance, the top court held that NLRB's certification of CIO as exclusive bargaining agent for West Coast longshoremen, was not subject to review by the Circuit Court. Justification for this view was found by Justice Stone in the text of the Wagner Act

At this modern Bliss Plant

BAKER CRANE TRUCKS add inside floor space!

Baker Crane Truck storing heavy punch press frames in the yard at the Consolidated Press Division of E. W. Bliss Company, Hastings, Mich.

Idle yard space is put to work at the Hastings, Mich. Plant of E. W. Bliss Company through the use of Baker Crane Trucks. In many similar installations, Baker Trucks are helping manufacturers meet the present-day production demand for more inside floor space by making yard storage available for heavy, bulky units. Their trackless flexbility makes these trucks serve double duty, handling heavy moving, millwright, and general utility work inside as well.

If you need more floor space, or if you are expanding and want to make the most of your new space, the Baker Material Handling Engineer can help you. Write today.

BAKER INDUSTRIAL TRUCK DIVISION of The Baker-Raulang Company
2170 WEST 25TH STREET • • • • CLEVELAND, OHIO

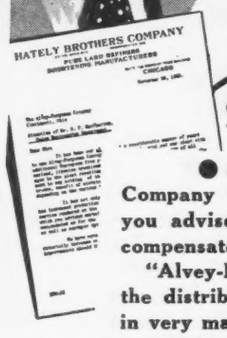
Only BAKER Crane Trucks have all these PLUS features

1. **Positive Full Contactor Control** on hoisting, topping and slewing motions, for greater safety and less maintenance.
2. **Scientific Weight Distribution** giving greater ratio of lifting capacity to dead truck weight.
3. **Duplex Compensating Suspension of Power Axle** (patented) increasing flexibility, and eliminating uneven floor strains.
4. **Noplug Travel Controller** (patented) making correct, careful operation compulsory at all times.
5. **Box-Frame Construction** giving greater strength and absolute rigidity with less dead weight.
6. **Widely Separated 2-Point Suspension** of slewing superstructure providing stronger design, with less twisting strain on frame.
7. **Complete Accessibility of All Units** resulting in lowered maintenance expense.
8. **Each Motor** used on Baker Trucks is Baker-made for its specific function.

Trade mark Registered U. S. Pat. Off
Baker INDUSTRIAL TRUCKS

WOULD YOU TOO LIKE TO CUT HANDLING COSTS 35%?

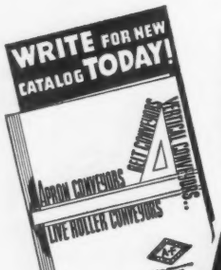
Then Read How Hately Brothers Did It!



● SAYS E. T. Miller, V. P. of Hately Brothers Company of Chicago: "Your engineering service in which you advised certain savings would be made has more than compensated us for the contract let at that time.

"Alvey-Ferguson Conveyors take care of all shipments and the distribution of made-up packages in the plant, resulting in very material savings to floors, trucks, benefit of elevators, etc., and we have *cut costs, depending upon the various items, from 20% to 35%.*"

Alvey-Ferguson Engineering Service can help you, too, in reducing operating costs and increasing efficiency. Without any obligation, write for further information—today!



Without obligation write for this New A-F Conveyor Catalog. The Alvey-Ferguson Co., 101 Disney St., Cincinnati, Ohio—today!

ALVEY-FERGUSON

SCIENTIFICALLY PLANNED *Conveyors*

CONVEYING MACHINERY

Is Maintenance Important?

Some companies consider maintenance a necessary evil, others recognize that a well planned program is the best insurance for continuous production and low cost operation.

Some of industry's most highly respected maintenance executives have written their views in recent issues of FACTORY.

If you have not already read these articles, we suggest that you review them because they offer many good sound reasons why maintenance is important.

Read FACTORY's "Maintenance Services" Section every month for tested methods gathered from plants all over America.

itself. This he appeared, at the same time, to deplore, saying that "failure to provide for a court review is productive of peculiar hardships which were perhaps not foreseen in cases where the interests of rival unions are concerned." Then he tossed the problem back to Capitol Hill.

"But these are arguments," he said, "to be addressed to Congress, not to the courts."

•

Corporate Monopoly Called a Woolly Wolf

The big bad wolf of corporate monopoly is not the fearsome fellow he appears to be. If he is not actually a sheep in wolf's clothing, he is at least a wolf who keeps changing his identity from time to time.

So says Rufus S. Tucker, who, to be sure, is connected with the General Motors Corporation. But Mr. Tucker brought some interesting new thoughts to the recent meeting of the American Marketing Association.

"Of the 100 largest industrial corporations in 1909," he says, "over 60 were no longer in the giant class in 1935 and at least 26 were outright failures." The growth of large corporations has been less rapid than the growth of the national wealth, he asserts, and has not been accomplished at the expense of "little business."

•

O'Mahoney-Hobbs Bill Called Menace to Recovery

Not much talked of now but typical of the sort of measure that can slide through Congress in the hectic horse-trading of a waning session is the O'Mahoney-Hobbs bill designed to put new teeth into the anti-trust laws.

Drastic penalties are provided in this bill for *all* officers and directors of corporations violating the anti-trust statutes. They could be jailed for a year, fined up to $5,000, *and* required to forfeit double the amount of their salaries, bonuses, or other compensations received during the entire period of the violation.

In its fullest application, the bill could have a result as serious as this: President Jones of the Such-and-Such Corporation could be locked up for a year along with all his assistants and the entire board of directors, leaving the company to manage itself. While in jail, Jones and all his fellow conspirators would have to pony up $5,000 apiece. Then they would have to dig a little deeper and hand over *twice as much money as they had made* during, let us say, the previous year. But that's not all. The same law could then

Good lighting—good tools—
How About GOOD AIR?

Does your ATMOSPHERE reflect your ATTITUDE toward your employees? Is your plant stuffy—smelly—and dank?

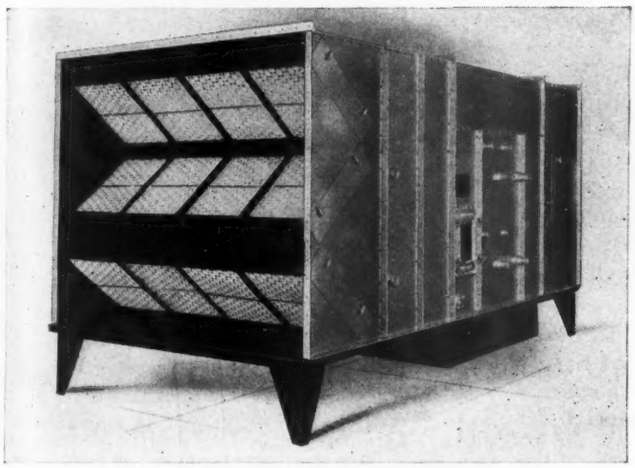
—Or is the air fresh, clean, reasonably humidified?

In the difference between the two conditions described above lies the relief for many a Production Man's Headache!

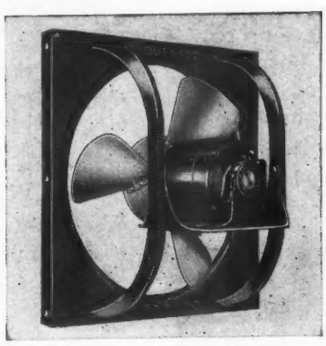
Employees work best when they breathe good air. They have fewer accidents when their minds are clear. They are more cheerful—and, of course, more healthy—in shops which are properly ventilated.

A few years ago air conditioning for employees was considered a luxury. Today it's a practical means to improve relations AND production.

For everything to do with the movement or conditioning of air, Buffalo equipment is available. Get the recommendations of Buffalo Engineers.



There is complete Buffalo Air Conditioning Equipment for every industrial requirement. Illustration above shows a type P C L W conditioning cabinet.



For ventilating small rooms, garages, etc. Buffalo Square Panel Breezo Fans are easy to install, efficient, QUIET.

Buffalo Limit-Load Fan mounted on silent floating base offers you the last word in QUIET ventilation.

BUFFALO FORGE COMPANY

471 BROADWAY, BUFFALO, N. Y.

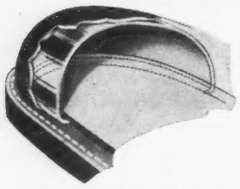
Branch Engineering Offices in Principal Cities

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"I HATE the Place Where Harry Works"

HARRY PAVLAC'S wife is sure he works in a dreadful place. Harry came home with a smashed foot... laid up for six weeks. Compensation didn't cover regular expenses. She had a "time" with him around the house.

Though the accident was Harry's fault, now his wife thinks he works for heartless employers who underpay him for dangerous work... who don't give a thought to his welfare or that of his wife and children.



"TURRET-TOP" TOE PROTECTION

Harry's accident didn't need to be an *injury!* Had he worn *Hy-Test* Safety Shoes, almost certainly the anchored steel toe cap would have protected his foot as it has thousands!

Hy-Test models fit for every job. Many fit for Sunday, too.

Thus, Hy-Test Safety Shoes contribute to labor harmony. They also save up to 20% of *total* compensation and hospitalization costs! But it's up to you executives to see that workers wear them!

More workers wear Hy-Test's than any other safety shoe. Write for free booklet, *Industry Speaks.*

HY-TEST SAFETY SHOES

Designed and Manufactured Exclusively by Hy-Test Division, The International Shoe Co., St. Louis, Mo., The Nation's Largest Shoe Manufacturer

Do You Read A Routed Copy?

If you are on a route list to read Factory Management and Maintenance, you probably pass it along without having the chance to read just the article that you would like best. Routed copies have a knack of arriving at inconvenient times—late—and often in poor condition.

Why not have your own copy delivered to you each month? Then you could read at your leisure—and while the news is still hot. A subscription costs only $3.00 per year. Send in yours NOW.

FACTORY MANAGEMENT *and* MAINTENANCE
330 WEST 42ND STREET NEW YORK CITY

prevent them from making any more money for a period of 90 days following the violation.

This, of course, is merely reinforcing a criminal statute with penal provisions. The really "disturbing thing" about this law is pointed out by the Guaranty Survey, publication of the Guaranty Trust Company of New York, which says: ". . . these penalties might be visited upon corporations and individuals *who had no way of knowing until a court and jury had decided the question,* whether a given act was or was not in violation of the anti-trust laws." (The italics are FACTORY's.)

For which reason—you may want to make a note of this if you have the good habit of writing to Congressmen occasionally—the Guaranty Survey asserts that "no other measure pending before Congress contains such a serious threat to business recovery."

•

Chicago Setback Checks Labor Board Powers

Some of the National Labor Relations Board's assumed prerogatives are not acceptable to all the federal courts —as witness the decision of the U. S. Circuit Court in Chicago which holds that the Wagner Act was intended to compel employers to enter into collective bargaining but not, necessarily, to enter into signed contracts.

This decision, a long-delayed repercussion of the 1937 "Little Steel" strike, may have far-reaching effects. It challenges, on grounds that NLRB lawyers will have to sharpen their wits to deny, successfully, the board's interpretation of the labor law at a very vital point.

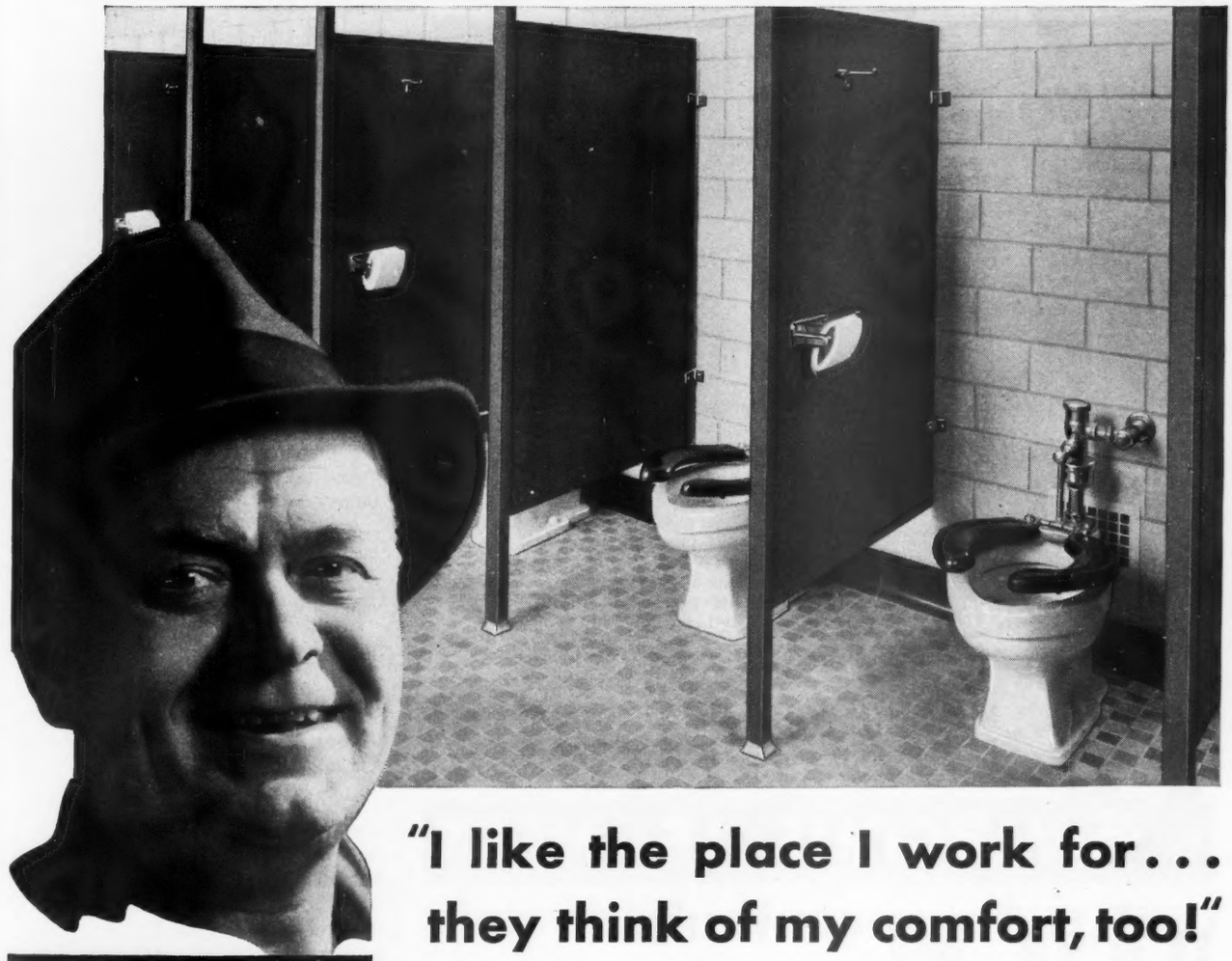
The Chicago case was an outgrowth of the Inland Steel strike which resulted when the Labor Board upheld the Steel Workers Organizing Committee in its insistence upon a signed contract. The Chicago Circuit Court now holds that the Wagner Act does not specifically support such a ruling, that it is intended to make collective bargaining, not contracts, mandatory.

•

Tobin Addresses Unity Plea to AFL-CIO Rank and File

Gruff, outspoken Daniel J. Tobin, chief of the powerful AFL Teamsters International Union, kicks over the traces every now and then. Old "Dan" keeeps insisting that AFL and CIO can be broken to harness. His insistence has frequently proved embarrassing to William Green and the other brass hats of AFL who are fiercely averse to compromise with John L. Lewis.

Tobin was never more embarrassing than he was last month when he



"I like the place I work for... they think of my comfort, too!"

IT makes a fellow feel pretty good when the people you work for look after your health and comfort on the job with plenty of fresh drinking water, with handy wash-up sinks, and safe toilet rooms. Believe me, it helps you do a better job. * * *

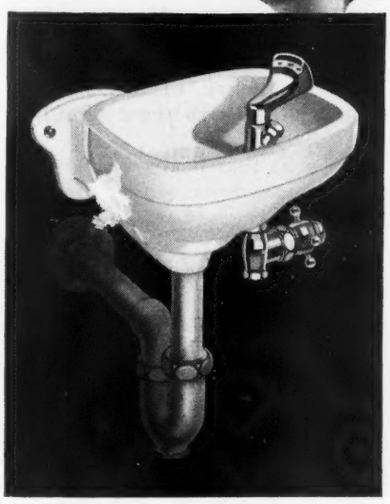
Modern plant management is recognizing the two-fold advantages of adequate and up-to-date sanitary facilities for employees. Such investment goes a long way in improving employee relations, and it pays immediate dividends in increased plant efficiency. In a recent business survey, 62% of a group of manufacturers stated that their 1940 budgets definitely included funds for such modernization.

Crane Industrial Plumbing affords added assurance of satisfaction in plant modernization expenditures. Because it is designed for industrial use, it will withstand the hard usage of such service and protect against high maintenance costs. And because it embodies practical convenience features, Crane Equipment clearly expresses management's interest in employee welfare.

CRANE WILL HELP YOU PLAN SANITATION IMPROVEMENTS

Industrial sanitation is a big and important subject—one in which Crane has thorough experience. If you are planning a new plant or modernizing an old one, Crane will gladly give you authoritative counsel on every sanitation problem, without obligation—and explain the advantages of expert installation by a licensed master plumber.

In the meantime, get acquainted with the completeness of the Crane Industrial Plumbing line and its superior values. Send for a free copy of Crane's booklet "Plumbing for Industrial and Commercial Buildings." It gives a lot of valuable information. Write today!



In plants equipped with these handy Crane No. C-9161 Thurstend *fountains, thirst is safely satisfied.* Newera *angle stream jet protects against contamination. Vitreous china receptor permits easy cleaning. Self-closing valve saves water. Compact—requires only 10 x 12 in. space.*

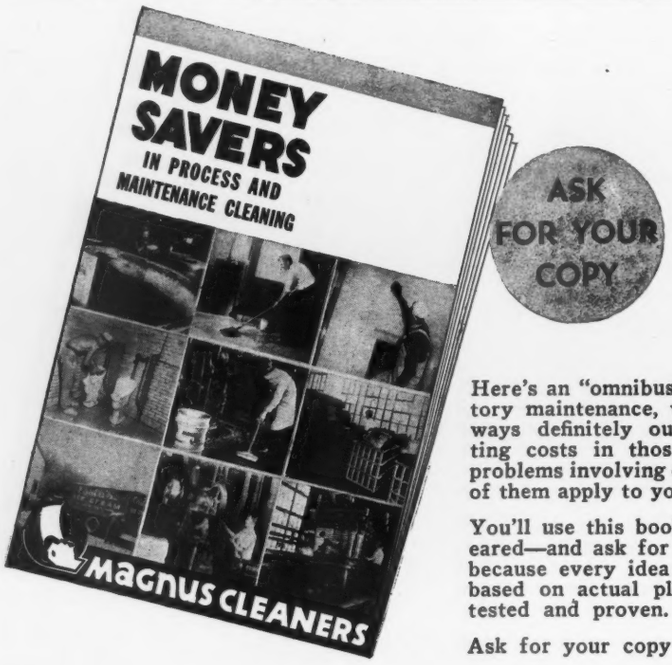
1940 OUR 85th YEAR

CRANE

CRANE CO., GENERAL OFFICES
836 S. MICHIGAN AVE., CHICAGO

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

NATION-WIDE SERVICE THROUGH BRANCHES, WHOLESALERS, PLUMBING AND HEATING CONTRACTORS



ASK FOR YOUR COPY

Here's an "omnibus" book on factory maintenance, with numerous ways definitely outlined of cutting costs in those maintenance problems involving cleaning. Most of them apply to your plant.

You'll use this book till it's dog-eared—and ask for another copy, because every idea it contains is based on actual plant practice—tested and proven.

Ask for your copy now.

MAGNUS CHEMICAL COMPANY

Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants

220 South Avenue **Garwood, N. J.**

MAGNUS CLEANERS

NEW STEEL

R&M LOW-HEADROOM HOISTS

Save Space and Money

R & M hoists are designed to utilize every inch of space with a maximum gain of headroom. Their steel wire rope smoothly and securely raises loads clear up to the carriage—18" to 36" *higher* than ordinary hoists, depending upon capacity and application.

You can increase available space where you now have bulky, obsolete hoisting equipment, install wherever you've needed a hoist but had no room to operate one. You can give your plant more headroom with R & M hoists, without expensive alterations.

Just write your name and title on a letterhead and mail it to us today. We'll get in touch with you at once.

ROBBINS & MYERS, INC.

HOIST AND CRANE DIVISION • SPRINGFIELD, OHIO

publicly appealed to the rank and file of union men both in CIO and AFL to sink their differences, get together, and ignore the factional quarrels of their leaders.

"Less than one dozen men," said Tobin, naming no names, "are responsible for the division of 8,000,000 organized workers. Let the workers ask themselves why 8,000,000 organized workers should allow a few men to keep them separated in two or three rival labor organizations."

Moreover, Tobin asserted, 95 per cent of labor's complaints against the Wagner Act are the fault of labor's own quarrel and not of the act itself. He predicted that the act would be "torn to pieces" by 1941 unless the unions joined forces to save it.

William Green, after reading Tobin's outburst, said:

"I feel it unwise and inadvisable to make any comment at this time.

John L. Lewis declined to comment.

•

Green Disclaims Power to Purge Criminals in AFL

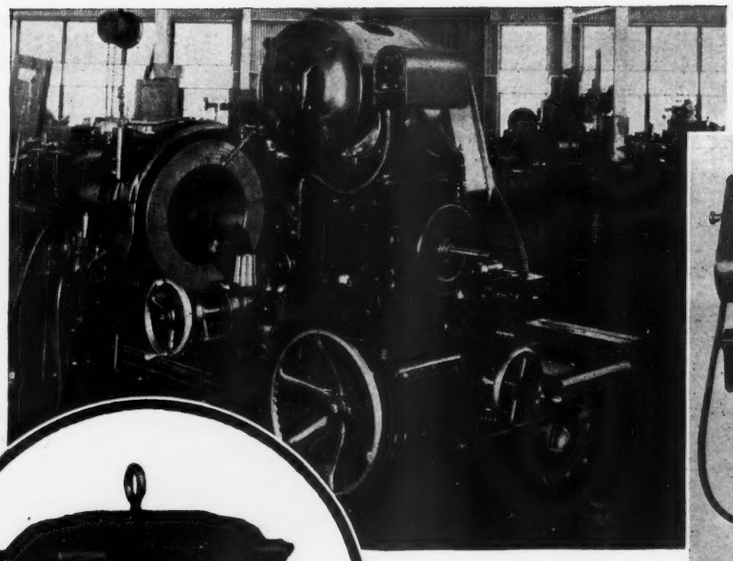
William Green wasn't talking about anyone in particular—at least he mentioned no names—when in St. Louis he uncorked a bottle of vituperation for the "hirelings propaganda-mongers" of the "enemies of labor."

But Westbrook Pegler, truculent columnist of the Scripps-Howard newspaper syndicate, took a bow next day and acknowledged Green's attack as a personal brickbat aimed directly at him.

For some time Pegler had been addressing open letters to Green in threescore daily newspapers. The full fury of the columnist's weird and colorful vocabulary was turned upon two prominent Federation leaders, Willie Bioff of the actors and stagehands union, and George Scalese of the building service international. Both men have known criminal records. Bioff is a fugitive, having jumped bail in Chicago after his conviction on a pandering charge some years ago. Scalese, a former follower of Al Capone, was once convicted in a white slave case.

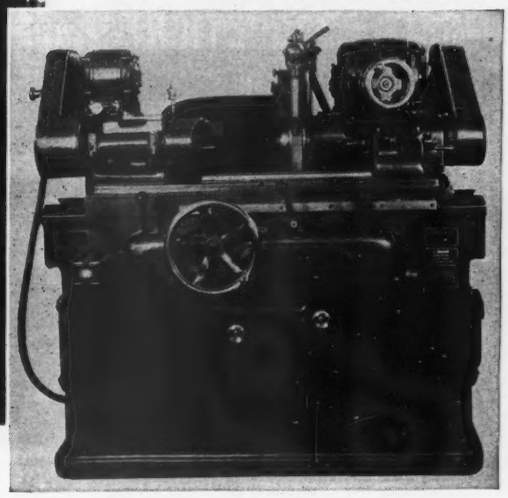
Pegler's persistent demands that Green "do something about" Bioff and Scalese finally stung the elderly AFL chieftain into this reply:

"We know that dishonesty is the rare exception rather than the rule in organized labor. . . . The American Federation of Labor denounces the miserable few who manage to worm their way into the labor movement and use it for dishonest and personal purposes. . . . The American Federation of Labor, as such, has no legal or constitutional auth-



Below — 3 Century squirrel cage motors furnish power for this grinding machine — a 5 h.p., a 1½ h.p. and a ¼ h.p.

At left — 3 Century motors furnish power for the threadmiller, a 7½ h.p. 4-speed, 5 h.p. 4-speed, 2 h.p., constant speed.



How Century Specified Motor Performance Prevents Misfits, Speeds Up Production, Assures Closer Tolerances When Applied to Machine Tools

Where the tool meets the metal — and that's where machine tool performance begins — freedom from destructive motor vibration greatly aids machine tool accuracy by preventing surface waves on the work.

Century Specified Motor Performance assures remarkable freedom from vibration, therefore closer control of tolerances and faster, more economical production. It greatly reduces the percentage of rejects and thus cuts production costs.

Highly specialized machinery requires careful adaptation of electric motor drives. Otherwise the low cost production features may be penalized.

Remarkable freedom from vibration is only one result of the thought, design and manufacturing methods that lie behind the Specified Motor Performance of Century Motors as applied to machine tool operations.

The growing preference for Century Motors by the metal working industry, is proof of their performance in such applications.

Century Motors are available in a wide range of types and ratings, from fractional to 600 h.p. Your nearest Century Motor Specialist will gladly give you full information on the complete Century line. In addition, there are 70 points abroad where exporters of Century motor driven equipment may obtain engineering assistance and advice.

CENTURY Specified Motor Performance

Means a high degree of technique in making and applying motors to produce predetermined machine results — whatever the machine application may be.

The trade has come to accept the Century organization as motor specialists because for 37 years Century has devoted its time and ability to this one task.

Specialization plus a wide range of motors makes it possible to assure SPECIFIED MOTOR PERFORMANCE. You get this extra service at no extra cost.

CENTURY ELECTRIC COMPANY

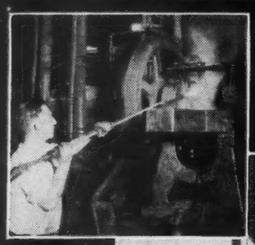
1806 Pine Street St. Louis, Missouri

Offices and Stock Points in Principal Cities

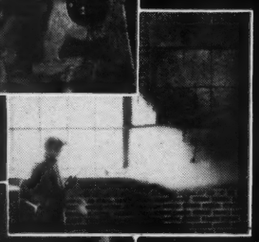
Century MOTORS

One of the Largest Exclusive Motor Manufacturers in the World

A SURE Way to Get MORE PRODUCTION!



SPEEDS MACHINE REPAIRS



BETTER LIGHT TO WORK BY

FASTER, SAFER PLANT TRAFFIC

HYPRESSURE JENNY Steam Cleaner provides one sure way of stepping up production and saving money at the same time. Keeps machines, tools, floors, windows, runways, free of dirt and grease. Insures maximum machine hours; and saves 15 minutes out of every machinery-repair hour. Improves lighting conditions, lessens fatigue, maintains peak worker efficiency. Saves up to 80% on all plant cleaning jobs. Our FREE, scientific SURVEY will show how much you can save in your plant. Tell us number of mechanics you employ on repair work; number of pieces and types of machinery overhauled per month; sq. ft. floor space, windows. Write for SURVEY. No obligation.

HYPRESSURE JENNY

HOMESTEAD VALVE MFG. CO.
P. O. Box 86 Coraopolis, Pa.

ority to police its affiliated, autonomous unions."

Bright and early next day, Pegler called Green a "Pontius Pilate" and challenged the labor chief to say "under what bridge at what hour of what night he [Pegler] was paid how much by what enemy of labor." Pegler accused Green of having remained silent too long after the Bioff charges while waiting for the columnist to "drop the other shoe" in the Scalese case.

"I am a centipede," said Pegler, "and I have a hundred shoes to drop."

•

April Slump Nonsense, Says Economist

The April "slump" predictions of government economists are being "poohpoohed" by some highly authoritative private rivals these days. Not the least is Dr. James Washington Bell, secretary of the American Economic Association, who sticks his neck far out into the first six months of 1940 and finds every one of them good. "Furthermore," says he, "I do not believe our recovery is based on the war."

•

Golden Gate Strike's End a Rebuke to Bridges

Harry Bridges won't be deported nor will he, on the other hand, be likely to hold such sway over West Coast industry and commerce as was his two years ago.

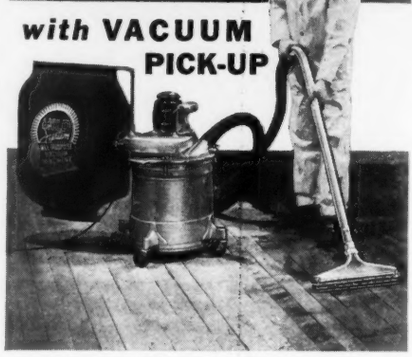
The California CIO leader finally won out in the prolonged hearings before Special Commissioner James N. Landis who declared, in a 75,000 word ruling, that the evidence tending to show that Bridges was a Communist Party member was not sufficient to warrant his forced return to his native Australia.

But the settlement of the San Francisco dock strike, coming shortly on the heels of this decision, was a definite setback to Bridges. It gave the Bridges-controlled unions their first taste of defeat and the San Francisco employers their first real sniff of victory in some years. The cost to both sides, as is always true in strikes, was dear. The Golden Gate port was all but blacked out during the struggle. Cargo, instead of rotting on the San Francisco docks, was diverted by rail to other coast ports. But the union said "uncle" at the end and the men went back to work under the same conditions that prevailed before they went out.

Prime issue was the closed shop. On this the employers stood firm and the union finally yielded. Some minor points were left to arbitration, mostly for the sake of saving face since the

CLEAN FLOORS THE SAFE QUICK-DRY WAY! HILD

Shower Feed SCRUBBING with VACUUM PICK-UP



BANISHES slip hazard because floors dry almost instantly. Cleans floors of all kinds more thoroughly . . . and saves the floor! Lowers soap cost, speeds up scrubbing — no mopping, no rinsing — lowers labor cost.

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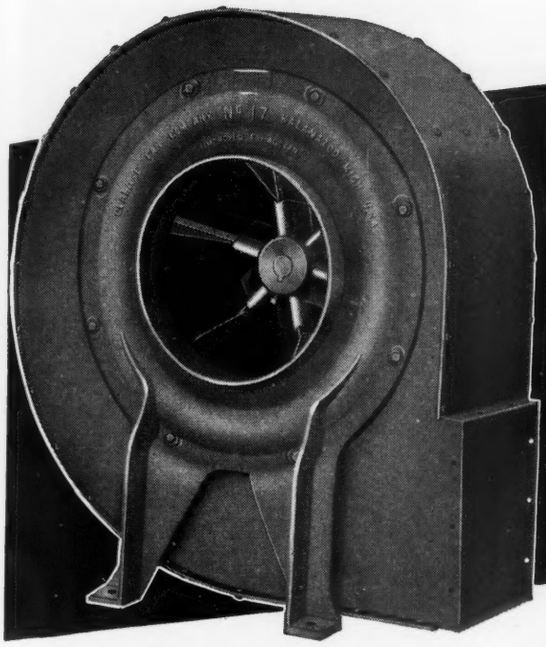

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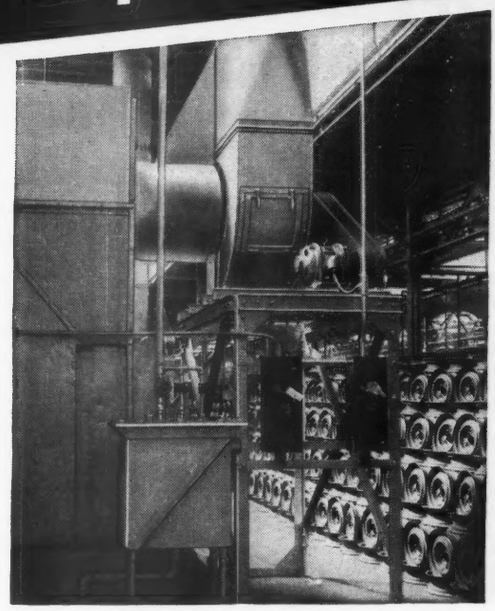

Clarage Exhaust Fans removing fumes from paint spray booths in an automobile plant.

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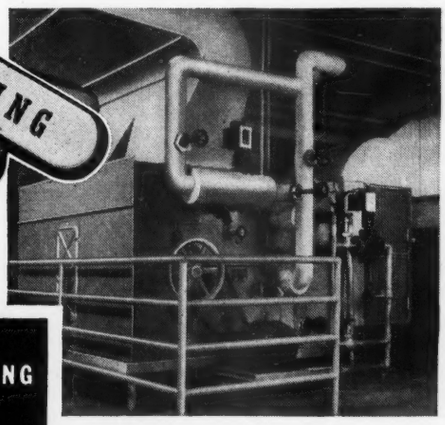

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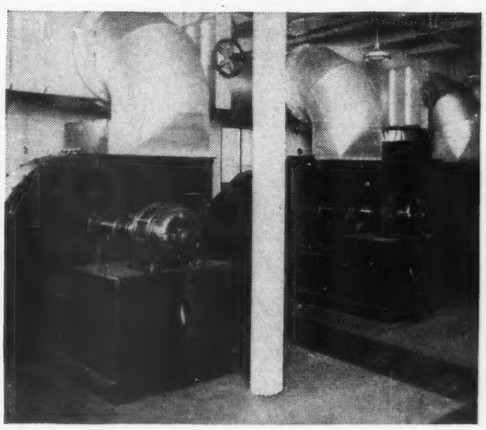

Clarage High-Pressure Blowers used on production in an oil refinery.

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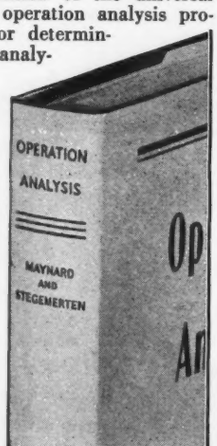

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Silver Bay Meeting Switched From August to July

A late August fixture for a score of years, the Silver Bay Industrial Conference casts precedent to the winds this year and announces its twenty-third annual meeting for July 24 to 27. The 1940 conference committee is headed by L. C. Morrow, editor of FACTORY.

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BOOKS

YOUR INCOME TAX

J. K. Lasser, Certified Public Accountant. Simon & Schuster, 386—4th Ave., New York, 128 pages, index. $1.

1940 edition. Contains a specimen form showing how to use the book; recites present status of rules governing preparation of income tax returns in simple non-technical language; includes special section summarizing this year's important changes.

INTRODUCING THE COMPANY TO YOU

Illustrated booklet acquaints employees with the history of Hygrade Sylvania, its employment and manufacturing policies, products and manufacturing facilities, vacations, employee benefits, Employees' Association, Credit Union. Free copies available to plant operating executives writing in on company letterhead. Hygrade Sylvania Corp., Salem, Mass.

SELECTED EDITORIALS FROM *LINK-BELT NEWS*

Believing "that there is more to business than just selling goods," the Link-Belt Company, 307 North Michigan Ave., Chicago, has published a group of editorials by prominent newspaper and magazine writers in a 64-page booklet that looks like the *Readers Digest*. The editorials, selected on the basis of their popularity from among those reprinted in *Link-Belt News*, were written by such men as George E. Sokolsky, Harry A. Earnshaw, Paul W. Kearney, Philip W. Swain. Copies are available free.

PHYSIK

Dr. Paul Wessel, Lecturer, Technical College, Wigan, Lancs., England. Ernst Reinhardt, Publisher, Munich, Germany. 550 pages, index. 4.90 Reichsmarks.

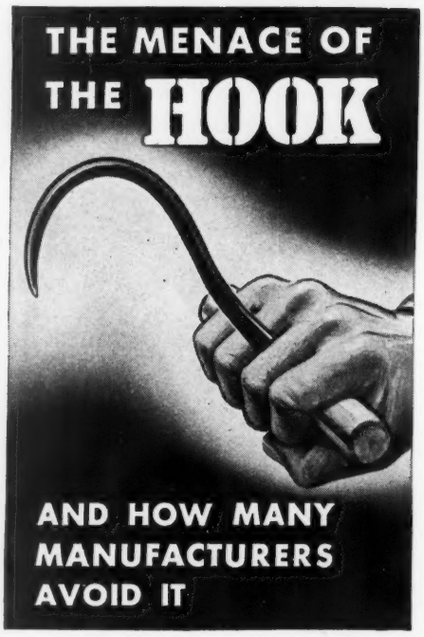
Written in German on a level suited for use by students in technical colleges and universities, this book treats physics as a tool. Part I deals with solid bodies, gas-forming bodies, fluids, acoustics, heat, optics. Part II treats magnetism, electricity, electro-magnetic forces, and gaseous discharge. Part III contains a summary, a list of 1,447 questions, and various tables. Explanatory diagrams are used throughout.

PRINCIPLES OF INDUSTRIAL MANAGEMENT FOR ENGINEERS

L. P. Alford, Chairman, Department of Industrial Engineering, College of Engineering at New York University. The Ronald Press Company, 15 East 26th St., New York. 531 pages, tables, charts, diagrams, index. $4.50.

Factual presentation of principles, methods, and techniques of control in industry explains these principles and their applications with illustrations, cases, and examples drawn from manufacturing practice. Topics dealt with: Evolution of industry and management; theory

(Continued on page 191)



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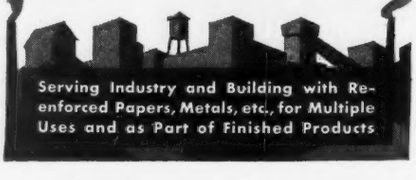

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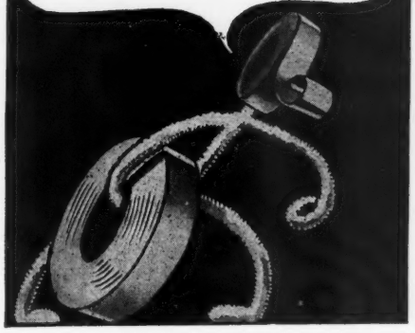

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(Continued from page 188)

of organization and the standards for the function of control; control of material in manufacturing characterized by Gantt as two-thirds of industrial management; fundamentals of time standards; classification and symbolization; cost accounting; plant maintenance; labor management and the employer-employee relation; measurement of performance and research in administration and management.

INDUSTRIAL ORGANIZATION AND MANAGEMENT

Ralph C. Davis, Professor of Business Organization, Ohio State University. Harper & Brothers, 49 East 33d St., New York. 636 pages, charts, illustrations, index. $5.

In rewriting *The Principles of Factory Organization and Management*, the author has, in this edition, stressed the formulation of principles of business organization and operation and noted important industrial changes and their effect on operating problems. Plant location, equipment, and trends in design are treated in two chapters. Added attention has been given to the problems of production and inventory control that are associated with continuous manufacturing, and considerable space has been given to labor relations and morale-building. Other topics discussed include time and motion study; industrial health and medical supervision; employee education and training; personnel research, standards, and control; office management.

BANNERS IN THE WIND

Col. Benjamin A. Franklin, Orlin Tremaine Co., 105 West 40th St., New York. 181 pages. $1.75.

When Benjamin Franklin wrote *Poore Richard's Almanac*, the individual was coming into his own. Today he is of prime importance. For his benefit a series of articles intended to stimulate his thought and action toward individual improvement has been written. Touching on such matters as opportunity, ideas and ideals, these articles are what Poore Richard might be if streamlined.

BUSINESS MAN—WHAT NOW?

W. Clement Moore, Cost Consultant, National Paper Box Manufacturers Association. Press Publishing Co., New Egypt on Oakford Lake, New Jersey. 63 pages. $1.

Contains a brief but pointed discussion of the problems taxes, laws, and government debt present to the business man; the industrial importance of money, men, merchandise, markets, management, machinery, and methods to the executive; the relation between fair profit margins and industrial stability; the executive's personal responsibility to the community. How knowledge of costs helps in measuring the business dollar, and the use of scientific control charts for price control and estimating control are explained.

•

ON THE CALENDAR

FEBRUARY

5–9, National Electrical Manufacturers Association, Mid-Winter Conference, New York. W. J. Donald, Managing Director, 155 East 44th St., New York.

14–16, American Management Association, Personnel Conference, Chicago. American Management Association, 330 West 42d St., New York.

MARCH

26–29, American Management Association, Tenth Packaging Exposition, New York. Alvin E. Dodd, President, 330 West 42d St., New York.

APRIL

30–May 2, Chamber of Commerce of the United States, Annual Meeting, Washington, D. C. Ralph Bradford, Secretary, 1615 High St., N.W., Washington, D.C.

Do you burn oil or operate Diesel engines?

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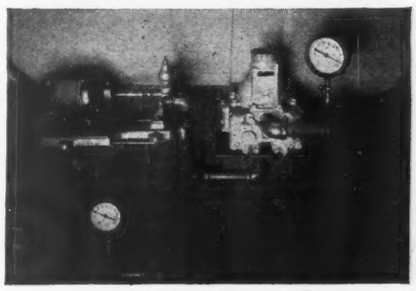

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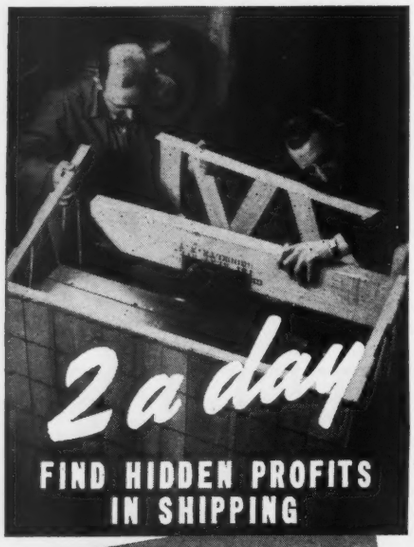

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